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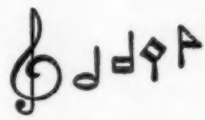

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Fixed or Movable *Do?*

ARNOLD BENTLEY

THE WRITING of this article was prompted by Henry Siler's "Toward an International Solfeggio," published in the *Journal of Research in Music Education* (Spring 1956). Siler's proposals challenge the music educator to think deeply about the principles involved; it is those principles that will be here examined, and that entails comparison between tonic solfa (movable *do* or *doh*) and *solfège* (fixed *do*).

Although Siler did not tabulate his proposals they may be set out as follows:

		da	te	ti
	do	ta		li
du	to		le	
tu		la		si
	lo		se	
lu		sa		fi
	so		fe	mi
su		fa	me	
	fo	ma		ri
fu	mo		re	
mu		ra		di
	ro		de	
ru		da		

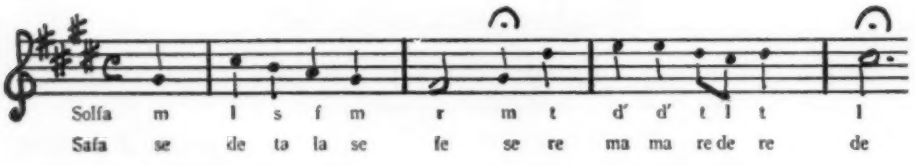
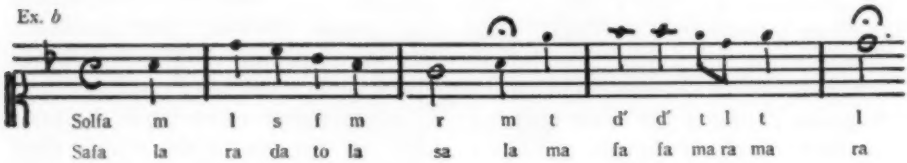
The middle column (*da ra ma* etc.) is always the scale of C major.

Tonic solfa is an extension of Guido's hexachord, which contained only one interval of a semitone between *mi* and *fa*: ut re *mi fa* sol la. This was a series of memorized sounds in the intervallic order: tone tone semitone tone tone. The semitone was the crucial interval. The hexachord had the function of a sliding scale: the sounds *mi-fa* were applied orally to any semitone appearing in the notation and the rest of the sounds (and syllables) fell into place around this. It was an oral nomenclature that could be applied to any of the modes of the 10th and 11th centuries. It was so simple and easily taught that (it is said) it rescued its inventor from trouble with the Pope. Six relative sounds were all that was necessary for the music of that period.

By the 19th century the modes had fallen largely into disuse, having been replaced by the octave scales, major and minor. The hexachord became a heptachord by the addition of *te*: d r *m f* s l *t d'*. Now there were two semitones in the octave (*m-f* and *t-d'*); but the function—that of the "sliding scale"—was the same as that of Guido's hexachord. The solfa scale would fit any key, major or minor. Thus, the necessary deductions from the key signature having been made in order to locate *doh*, the same oral syllables are used in any key.

All this, of course, is well known. But do we always appreciate the fundamental soundness of the system? It is, as it were, an aural background to the reading of staff notation.

What are the mental processes involved in reading examples *a* and *b* from the *St. Matthew Passion?*

Ex. *a*

Ex. *b*

Using solfa the mental processes are:

1. Establish *doh* from the key signature.
2. Forget the key signature and sing, either *a* or *b*. Both are easy. The tune is the same (even if transposed), and the syllables are the same.

Using safa the mental processes are more complicated:

1. Establish *da*. (Safa in itself can not ensure absolute pitch, so one is still dependent upon an instrument for this.)
2. Establish the first note: *se* in *a*, *la* in *b*.
3. Working from the initial note, sing the rest, remembering all the sharps (*e* instead of *a*) and flats (*o* instead of *a*). This is thinking fundamentally in the key of C and making individual adjustments for every sharp and flat indicated in the key signature.

Siler himself criticized *solfège* when used for any key except C major: — ". . . so that by the time one arrives at seven sharps or flats everything one is saying is different from what one is thinking!" And he quotes Frugoni as making a few "chromatic distinctions."

I suggest that the simpler process is to think in terms of the series of sounds most used in music (even now, in 1959), i.e. the diatonic major scale, in any key and not confined to the "pure" C major, and that all chromatics, yes and the minor modes, are consciously or subconsciously regarded as variants of that. The diatonic major scale is an acceptable series of intervals, ***the same in any key***. Solfa provides names for that series of intervals, not for one key only but for all keys. Once established, it is safe in all keys. It becomes merely a matter of remembering where *doh* is on the stave. The movability of *doh* on the stave does not cause difficult visual complications even for the C-major-minded pianist; and the solfa-trained singer can read from the C clefs as easily as from the G or F clefs.

On the other hand *solfège*, and safa, are based on one key (C) and that key must inevitably be the "anchor"; all else must be related to it. "Any raising of a tone of the scale of *da*-major by a half step is psychologically suggested by calling it by the acoustically higher pitched international vowel

e . . . So the scale of *sa*-major (G) goes thus: *sa la ta . . .*"

Let us consider the scales of C, G, and F and their relative sounds. Is there any "psychological" difference between them? The relative order of tones and semi-tones is exactly the same in each scale. Yet safa would use the following (as quoted by the author):

C major: *da ra ma fa sa la ta da.*
G major: *sa la ta da ra ma fe sa.*
F major: *fa sa la to da ra ma fa.*

Starting on different notes they all represent the same order of relative sounds: tone tone semitone tone tone tone semitone. Where is the "psychological" difference? They could all be termed simply *d r m f s l t d'*. Moreover the vowels following these initial solfa letters are "psychologically suggestive" of the crucial intervals involved, i.e. the semitones: *me* (*mi* if you like) being a semitone below *fah* (or *fa*); *te* (or *ti*) a semitone below *doh* (or *do*); and both "psychologically" tending or leaning towards the sound a semitone above them.

It would seem that the vowels for the 2nd and 5th degrees were retained, in both solfa and *solfège,* for purely historical reasons. *Ut* has given way to *doh* in some countries, and it might reasonably be suggested that *doh* (*do*), *ray* (*re*), and *soh* (*sol*) could be changed to *da, ra,* and *sa* to make things more logical. The scale would then read: *da ra mi fa sa la ti da.* The "psychological suggestion" is that 'i' tending to move up a semitone would be retained in *mi* and *ti.* In the chromatic scale the diatonic semitones would remain unchanged (*mi-fa* and *ti-da*) as in staff notation. The chromatic scale would then read: *da di ra ri mi fa fi sa si la li ti da; da ti to la lo sa so fa mi mo ra ro da.*

Safa indeed seems more logical and thorough than *solfège,* and the idea of creating a language suitable to international usage is most attractive. It has the advantage of naming in a simple way the absolute pitch sounds. Yet in spite of some similarity of nomenclature tonic solfa and safa are founded upon fundamentally different basic principles. Solfa is based upon the intervals of the diatonic major scale irrespective of key (i.e. on relative pitch). It is an aid to the formation and naming of mental tonal images arranged in a certain acceptable order of tones and semitones. Safa is based upon a single diatonic major scale, C (i.e. on absolute pitch). In order to sing any other scale one must think back, as it were, to C major or *da ra ma* etc., and, with Frugoni, make "chromatic distinctions." This is a much more cumbersome and hazardous operation than establishing a key and then, forgetting the technical complications of the sharps and flats, singing in it.

All through I have stressed singing because only through vocal reproduction can one have evidence that the printed score has been 'heard' correctly, i.e. has been interpreted accurately in the mind of the reader.

There are a few further points I should like to make:

1. Henry Siler states, "It is generally conceded, I think, by those who know the various systems, that the one employing the fixed-*do* is best." This, and his own "limited observations" are not proof, and do not form an unassailable foundation on which to build a system. Tonic solfa, *solfège,* and other systems are aids to the memorizing and naming of the sounds of music. They are systems of teaching, pedagogical tools. If one can be

proved more efficacious than another then a service will have been rendered to musical education. But proof is essential; and only experienced investigators could provide it.

2. "A musician can learn its" (i.e. safa's) "theory and terminology in a few minutes." Very true; it would be useful as a kind of musical Esperanto *for the already trained musician.* If that is its main purpose then all that I have written is beside the point. What is its use to the child, or other beginner, who is not yet a "musician"? Surely that is the real test.

3. Exactly how will this system encourage "greater musical intelligence and less typewriter mechanics"? Taking my first music example I can sing the printed notes as "G-sharp C-sharp B A G-sharp etc.", or as "*se de to la se* etc." The second is certainly simpler from the point of naming, but it does not enable me to "perceive musically the various intervals" any more clearly than the first. Siler himself admits: "Safa is simply *A B C's* with singable and suggestive terminology." Either I can, or I cannot, relate all the printed notes to C (fixed-*do*); safa is basically only suggestive of C major, and many "distinctions" from this basis have to be made in order to sing in, or apprehend correctly, the key of E major.

4. "There is no apparent reason that a beginning instrumentalist might not be started with safa instead of *ABC's, or soon thereafter, as is sometimes done with English solfeggio.*" Throughout I have understood — I hope correctly — "English solfeggio" and "tonic solfa," as used by Mr. Siler, to refer to the same thing. Solfa, at any rate in England, is not regarded as a form of instrumental notation. Mr. Siler recognizes this when he states, "The English system . . . uses movable-*do* for vocal music and *ABC's* . . . for instrumental music." It is basically a system of aural training, essentially for oral use, not instrumental. As a written notation for performance it is only used by singers, and even by them in dwindling numbers. Yet singers using solfa notation are usually far more accurate in pitch and time than the hit-or-miss staff-notation-only readers.

6. "Much of their" (i.e. the English) "*do-re-mi* terminology, with its uninternational British spelling, is quite incomprehensible to us already." When tonic solfa is printed out as a notation, only the initial letters are used for the diatonic degrees of the scale. Chromatics have two letters only. (Incidentally, as a shorthand in dictation, for both pitch and time, I have yet to find a system faster, easier to write, or more reliable.) The full spellings, *doh ray me fah* etc., are rarely used except on some of the modulators, and in texts such as this where, for example, *doh* (sic) cannot be confused with *do* (the verb). In England also much of the "*do-re-mi* terminology" is "incomprehensible" today; and our lack of such comprehension is our musical loss. (See Appendix)

7. What means will be used to denote the various octave pitches in safa?

8. The proposed system might be "more suitable to modulation and atonal idioms." Surely not to modulation, whose essence is tonal; possibly to atonal idioms. Yet *da ra ma* etc. is a foundation which is essentially diatonic. If we must have an atonal system then, surely, the diatonic foundation should be discarded entirely, and a semitonal, or microtonal, scale taught to beginners (singers and in-

strumentalists alike) without the tendencies explicit in the solfa system and implicit in safa.

I have asked questions, and I have been critical of the suggestions put forward by Mr. Siler, but not from an attitude of insular English-ism or British-ism. I do not even regard tonic solfa as particularly English or British, for its principle and most of its terminology had been practiced internationally for centuries before John Curwen and Miss Glover revived it in England. But I do regard it as a most useful means of aural training and teaching music reading, enabling even the person who will never play an instrument to interpret accurately (with all the mental processes that involves) the staff notation of the musical score. Used thoroughly and imaginatively *it works*. And I do not believe in condemning any proved system of teaching in favor of something new before studying that proved system thoroughly, and attempting to assess its value, and, of course, its shortcomings. In England, too, many teachers, musicians among them, dismiss solfa as something antiquated or beneath their notice. It is as "incomprehensible" to them as it is to Mr. Siler's "us" for the simple reason that, having approached music entirely via an instrument and *ABC's*, they have not tried to comprehend. Their attitude is conditioned by their own ignorance of the solfa system, its basic principles and its potentialities in teaching.

When safa, or any other system, is proved to be superior, I, for one, shall welcome it and use it. But proof must be given, from experiments in which each system is used with equal enthusiasm by equally good teachers, and with groups of pupils of comparable age, ability and interest, as far as that situation is attainable.

Appendix

The following extracts from Helmholtz, *Sensations of Tone* (trans. A. J. Ellis, 1885, Longmans Green; Appendix XVIII: "Just intonation in singing") are of interest as being written at a time when solfa was widely practised in England.

"Since the intervals of the natural scale are transferred to each new tonic as it arises in the course of modulation, all keys are performed without tempering the intervals."

"The ordinary" (i.e. staff) "notation gives directly nothing but absolute pitch, and that, too, only for tempered intonation. Anyone who has frequently sung at sight is aware how much easier it is to do so from a pianoforte vocal score in which the harmony is shown, than from the separate voice part. In the first case" (i.e. solfa) "it is easy to see whether the tone to be sung is the root, 3rd, 5th, or dissonance of the chord which occurs, and it is then comparatively easy to find one's way [Footnote:] (After a pupil has thoroughly acquired music on the solfa notation, it becomes part of his duty to learn the other, and a course of instruction has been prepared for this purpose by Mr. Curwen, which when properly mastered—a comparatively easy task—puts the pupil in a condition to sing at sight from the old notation as readily as from the new. Translator); in the second case" (i.e. staff notation) "the only resource of the singer is to go up and down by intervals as well as he can, and trust to the accompanying instruments and the other voices to force his own to the right pitch."

"Now the notation conveyed to a singer who is familiar with musical theory, by an examination of the pianoforte vocal score, is conveyed by the notation itself of the tonic solfa-ist, even to the uninstructed. I have convinced myself that by using this notation it is much easier to sing from the separate part than in ordinary musical notation."

Helmholtz was amazed to hear 40 children (ages 8 to 12) reading with great accuracy of intonation, including music in two parts with dissonances of a semitone. In a letter to John Curwen he refers to the "complete success of your system," going on to say, "I was particularly interested by it, because during my researches in musical acoustics I came from theoretical reasons to the conviction that this was the natural way of learning music, but I did not know that it had been carried out in England with such beautiful results."

A footnote mentions the Crystal Palace festivals of the tonic solfa-ists, where up to 5,000 people took part in *sight*-reading, including an anthem by Macfarren (at that time a contemporary composer).

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The Teaching of Music Appreciation

HANS TISCHLER

IT IS WELL to define the objectives of a course in music appreciation before discussing the possible avenues toward their attainment. Usually such a definition is not formulated because it is tacitly assumed that everybody knows and agrees on the objectives. However, a clear statement always aids and serves as a good guide to practical achievement.

Probably most teachers of music appreciation classes will agree that their primary objective is *a better appreciation of music as heard.* Here the term "appreciation" includes (1) enjoyment; (2) some perception of the ingenuity that has gone into the composition of the music, that is, of the technical and structural elements of music and their various employment; and (3) some grasp of the social functions and historical roots of music—of the types of works (such as operas, Masses, dances, or symphonies) and of the various styles. By "music as heard" is meant an emphasis on listening to music and less emphasis on secondary experiences, such as biographies of composers or virtuosos, the psychological or acoustical explanation of tones and hearing, the fingering and playing of the various instruments, or the writing of some "original music."

No apology is necessary for attempting these objectives. They are as noble as those of illuminating the works and ideas of dramatists, sculptors, philosophers, or social scientists. And they can be attained to the same degree here as there. Perhaps the parallel with these other fields goes even deeper and suggests certain methods. For example, in none of them can introductory courses be fruitfully organized by following a single principle, such as the historical approach, biography, or one particular element of technique. Similarly, such organization must be rejected as inefficient for music.

To this writer it seems also that the approach through the single principle of style cannot be followed throughout. Style is the result of the interweaving of all the primary elements of music—rhythm, melody, harmony, counterpoint, instrumentation, expression, non-musical associations, and structure—combined with historical, social, and biographical influences. If these different ingredients of music appreciation are from the start presented together, the student either must have previously acquired a good understanding of all of them to follow the stylistic analysis, or he will not be able to come to a clear insight into style. Of necessity this approach will, in other words, de-emphasize these important ingredients of appreciation. If, on the other hand, all the above materials are separately studied, the style analysis will be the result and climactic conclusion of the course rather than its starting point, which seems much more desirable. This procedure would emphasize the various facets of music appreciation in their own right rather than subordinating them to something else.

The achievement of emphasis on

the primary ingredients in our classes is a question of allocating to such an emphasis enough time by de-emphasizing what has been above called secondary experiences, including such activities as picking out tunes on the piano, writing some simple original music, bowing or blowing certain instruments, singing harmonies, or acting out musical forms. These activities are all excellent and helpful, to be sure, but they consume far too much time to be included in our courses. Besides, even music majors need years of study before most of these activities yield fruitful experiences.

Some of them may well be introduced into the classroom, because they contribute directly to the primary objectives. The demonstration of various instruments, some muscular activities such as tapping to vitalize the experience of rhythm and meter, and the singing of motives and themes provide immediate aids to memory and insight. Nevertheless, most of these activities should be relegated to study periods or laboratory sessions because of the time they consume. The same is true of the rudiments of note reading, fortified by some note writing, so important for the grasp of musical examples and scores.

In addition, one important point must be made here: All secondary factors should be introduced not as separate study units, as is done in some textbooks, as "theory" distinct from musical experience, but as derived from and as part of music listening. This would appear to be the only way to make these factors meaningful and immediately applicable to music as heard. The separate discussion of rudiments, moreover, often goes far beyond the needs of listeners and attempts to inculcate in laymen material which requires years of study by the music student before it is assimilated.

To repeat: The chief objective should at all times remain the appreciation of music, which we have analyzed roughly into five ingredients, to wit: enjoyment, perception of the technical elements, knowledge of the various types of musical works, insight into the social meanings of music, and grasp of styles both as they evolve through history and as they emanate from individual genius. As already indicated, the approach to our objective through one of these only will not be completely satisfactory, because it will have to subordinate the others. If, for instance, increased enjoyment is the main line of attack—and this is by no means an unworthy aim, fundamentally leveled at providing the student with a basic repertory through repeated hearings—the time will be chiefly spent on listening, and discussion will be minimized. Similarly, the approach through one of the elements of our music—rhythm, melody, etc.—will be one-sided, as will be that through any one style, *e. g.*, the classic-romantic, or that through a particular type, such as orchestral music or opera.

Even the approach through most or all the elements of music, made in a recent textbook for music appreciation courses, is not entirely satisfying because it must de-emphasize the historical and social aspects and give an incomplete presentation of the various types of works in our repertory. This approach as well as that through history alone has been taken in several textbooks of the past fifteen years, some of them excellent in their way, but all suffering from one-sidedness.

Perhaps the search for the single

principle on which to base the course has been the obstacle to its best realization. Instead, it is here suggested to adopt a multi-principled approach. The course may well be divided into several units, each based on a different principle, but all progressively arranged and correlated. In the following paragraphs, one attempted solution is described.

According to this plan, the student experiences music in turn from the viewpoints of social meaning, of historical evolution, of structural pattern, and of instrumental type. Out of a semester he spends about three, six, three, and four weeks respectively on these units, which are progressively arranged in the order of length and complexity of the works discussed in each.

Unit I aims at giving the student an understanding of functional music for work, war, ballad, dance, and cult, and of art music for home, concert, and stage. From the simple, short pieces included in this unit are derived the basic concepts of music "theory" introducing the elements of rhythm and meter, melody, harmony, and expression, as well as the rudiments of note reading. The student also becomes aware of the existence of both Western and non-Western music.

Unit II traces the evolution of musical styles and types which characterize the various periods of Western culture up to our own time. It includes such topics as the Mass, the oratorio, the prelude-and-fugue, the suite, the opera, and the ballet, all essentially composed of series of small pieces. Incidentally, the student becomes acquainted with the outstanding masters of each period and observes the development of polyphony and homophony, of the chordal concept and of harmony, of *basso continuo,* tonality, and atonality. A grasp of the elements of counterpoint, of instrumentation, and of non-musical associations is easily derived from the music discussed in this unit.

In Unit III the student deals with large single pieces while considering the last major element of music — structural pattern. Here the previous listening experiences can be relied upon to furnish much illustrative material on which the student can fall back. This material enables him to grasp the general categories of potpourris, variations, tone poems, song and rondo patterns, and sonata-forms. These structures thus become living experiences for him rather than remaining theoretical constructions, somehow separate from music itself—molds into which composers may pour musical contents.

These experiences are deepened and further clarified in Unit IV. Here the discussion concentrates on the most complex works of our music: sonatas, string quartets, concertos, and symphonies. It brings to bear upon these works the combined learnings derived from the preceding units—the recognition of the roles of the various elements of musical texture, meaning, and pattern, of the styles and their historical backgrounds, and of the social values of music. This unit, therefore, reveals to the student artistic quality in its full significance. As it concentrates on the great masters and the stylistic trends of the past two hundred years or so, it becomes, as it were, a grand finale of his entire course of study.

Under no plan is it possible to touch upon all the highlights of musical literature. But the above plan does have the advantage of providing a

good sampling from small and large works alike. It seeks a balance between vocal and instrumental, solo and ensemble, church and secular, old and new music, so the student may learn to appreciate not only the brilliance of a symphony orchestra but also the more reserved approach of chamber music, not only the lyricism of songs but also the dramatic sweep of opera and oratorio.

Whatever the plan, some analyses of musical compositions will be needed. This is one of the weakest points in many books. Some writers try to avoid analyses by substituting some glib phrases of purple vocabulary. Others only direct the student's attention to some points in the music which serve to demonstrate certain technical materials presently under consideration; but usually the student cannot appreciate the points because he cannot locate the phrases in the work. A third author will anlyze in terms of measures: "After thirty-three measures we hear the second theme. Six measures before the end of the exposition the violin has a particularly graceful phrase," etc. Unless studied in the score, such analyses are meaningless for anybody, for who listens to a piece of music by counting measures—especially backward?

There are several further types of analyses, all of them of limited value to the lay-student: literary background materials as found in program notes; the quotation of several important motives without giving an insight into their employment throughout the work; the recital of particularly "beautiful," "ingenious," "exciting," "dramatic," or "tragic" passages without reference to what happens between one such passage and the next—so that the student either misses the phrases or misses everything else lest he miss them—and without reference to how these phrases relate to the entire piece.

The aim of any analysis is, of course, to guide the reader toward a better understanding of what he hears and toward applying what he has already learned as well as to derive some new learning from his listening experience. It seems that the following guiding principles would lead toward such analyses:

a. Guide the student through the entire composition; eschew details, except where they are needed for the learning process (in this case give sufficient musical examples); but outline all major sections of the music, or the student will be lost and confused.

b. As a means of orientation, so that the listener knows at all times what point in the music he has reached, call to his attention certain easily recognized landmarks: a particular sound effect, climax, or pause, for example, especially where they are of structural significance.

c. Establish through a few references to emotional associations certain helpful listening attitudes in the student, without suggesting to him a complete sequence of emotive experiences or an evaluation.

d. Add some remarks on the social function of the music or on the historical situation in which it was created, whenever this contributes to an understanding of the style.

e. Explain the composer's characteristic attitudes without breaking into hymns of praise—the word "genius" should be nearly taboo.

f. Stress some noteworthy details of

texture, construction, instrumentation, or non-musical associations, but only a few.

Analyses written according to these rules may read less story-like than others, but they will make musical sense to the hearer of the work and to the student.

Let us briefly restate the points which this paper has tried to make: A course in music appreciation is similar to one in art appreciation or one in poetry in that

(1) it cannot spend much time on peripheral matters, such as technique of composing, biographic detail, and mechanism and performance of instruments; like attempts to paint pictures or to write poems, the playing of instruments or the writing of original music may be fun for the student, but it does not contribute enough to the appreciation of masterworks to warrant the spending of much time;

(2) it must develop helpful technical concepts from artistic experience rather than through theoretical discussion; systematic presentation of such concepts is not always necessary, but where it occurs it should follow rather than precede the explanation of the single concepts, which are derived from the music as heard by the student;

(3) it should be clearly organized and not proceed at random; but it should not follow a single principle. Among the approaches should be a clear presentation of the eight elements of music, of the spirit and characteristic production of the various periods of music history, of the styles and types of music, and of the variety of formulations, instrumentations, and social uses of musical compositions.

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Changing Aspects of American Culture As Reflected in the MENC

JOHN W. MOLNAR

THROUGHOUT THE FIVE decades of its history, the Music Educators National Conference has reflected to a considerable degree the changes which have occurred in music education and in education in general. Back of the modifications in school objectives and programs lie forces in the social, economic, and political realms. This article will suggest some of the relationships between the activities of the Conference and various movements outside the Conference, on which its work and growth depend.

The Conference always has been the meeting point for general education and music education, reflecting the motives of general education in the field of music in the schools. These include the religious, political and nationalistic, utilitarian, and mass education motives that have been dominant in the history of American education.[1]

The religious motive may be said to have dominated American education from 1625 to about 1770. Obviously, school music was not greatly influenced by this drive after the founding of the Conference. However, remnants of it can still be found today. Various publications show the importance of religious music in the schools. The high schools reflect the influence in their choirs with their quasi-religious vestments, the name itself of the singing groups, the emphasis on music for religious holidays, and the singing of the school choirs in the churches of the community. In the elementary school, religious songs form a large part of the repertoire of the children's singing activities. One of the avowed aims of school music today is the improvement of church and Sunday school singing as a carry-over from the school music program.[2]

The political motive in American education was dominant during the period approximately from 1770 to 1860.[3] The schools served to weld the country into a unified whole, and to develop the ideals of democracy. This force has continued to be important, as has been evidenced by the addition of the social subjects to the curriculum. During World War II, the teaching of democracy and "Americanism" again was a major objective of the schools.

During World War I, the Conference did not spend nearly so much time and energy on the war effort as it did during the second war. The schools, and for that matter the nation itself, were not mobilized to the extent that World War II demanded. The Conference was still in its comparative infancy, and was not then the well functioning organization that it was in 1941. Nor had school music

[1]J. Minor Gwynn, *Curriculum Practices and Social Trends* (New York: The MacMillan Co., 1943).

[2]Resolutions Committee, "Statement of Beliefs and Purposes," *Music Education Source Book* (Chicago: The Conference, 1947), p. iv.

[3]Gwynn, p. 40.

itself attained as great an importance or recognition.

During the intervening years, the political motive was reflected in school music, and hence in the Conference, in a variety of ways. The efforts at correlating music with the social subjects provide one example. Another was the emphasis put upon community music, which has been held to be an excellent way to develop community spirit. The most obvious example is found in the war activities of the Conference during World War II, when much stress was put upon music as a means of uniting the people. The development of a patriotic and nationalistic feeling of sacrifice for the common good was a major objective of the war program of the profession.

There is a conflict of ideals in the use of music as a means of developing nationalism. The musician is in reality a cosmopolite, speaking a universal language. Through his music, the musician hopes for a closer approach to the ideal of the brotherhood of man. Beethoven sang of this dream. There is no other vocation in which nationality means so little. So it was that when the true musician in Nazi Germany was called upon to use his music for Hitler's purposes, he left the country if he possibly could. It is true that the nationalistic schools of music rose during the latter part of the nineteenth century, but the composers of these schools merely used the folk music and idioms of their countries as materials out of which they fashioned their compositions. Essentially the music was still universal.

The music educators have recognized the conflict of ideals. In its program in World War II, the Conference urged the utilization of the music of all nations, including that of the enemy countries. The justification for this, if any was needed, was that America is made up of peoples of all the world, and that their music has added to the American culture. It was felt, too, that the understanding of a people would be helped through a knowledge of their music.

Thus the political motive has shifted from pure nationalism to internationalism. For several years after the establishment of the United Nations, the interest of the school pupils in the organization was especially fostered through music as well as through other phases of education. The Conference has been, and still is, vitally interested in the role of music in international cultural relations.[4]

The utilitarian motive in American education was dominant from 1860 to 1920. The principal thesis of educators stressing this motive was that graduation from school meant betterment in one's position in life. The trend was shown by the rapid addition of vocational and appreciation subjects to the curriculum. Four large movements reflected utilitarianism in education. They were the establishment of the high school at public expense, with emphasis upon preparation for college; the granting of federal aid, especially in vocational education; the establishment of specialized schools, especially technical and commercial; and the emphasis on economy of time in education.

The Conference came into existence when the utilitarian motive was dominant. As the high school won its way, music teachers worked to insure the acceptance of music in the curriculum. Although the principle of music edu-

[4]Council of Past Presidents, "A Declaration of Faith, Purpose, and Action," *Music Educators Journal, 33* (April 1946), 16-17.

cation at public expense had already been accepted rather generally at the time of the founding of the Conference, only a small percentage of the nation's schools actually included music instruction in their courses of study. Increase in the percentage was a concern of Conference leaders for many years.

They were also concerned with the effect on music of the increased momentum toward vocational training which occurred before World War I.[5] The danger was that music might be eliminated in favor of vocational subjects. The leaders of the Conference met the threat by pointing out the importance of music in the economic life of the nation,[6] and by raising standards of achievement in their classes and in the preparation of new teachers. While the Conference was not instrumental in establishing specialized schools for the training of music teachers, it did influence the curricula of teacher-training institutions offering work in music education to a great extent.

Starting about 1913, music educators were engrossed with ideas of "standardization" and "efficiency" in their teaching, reflecting another facet of utilitarianism. Such discussions were started by the publication of the reports of the Committee on the Economy of Time in Education.[7]

Undoubtedly these concepts were at least partially brought over into education from industry, which was full of them at the time. The members of the Conference were eager to set high goals of achievement in their work, as they groped to establish their profession on an equal status with the accepted subjects in the curriculum. Such efforts were perhaps the result of a feeling of inferiority. The music teacher and his work were certainly not on the same established level as was the teacher of the more traditional subjects. The desire to achieve the same recognition and respect must have been at least a part of the motivating force behind the surge of energy that was expended by the music teachers in seeking recognition. One way to gain respect was to set standards of achievement, and win college entrance recognition for music.

A most compelling motive in American education from about 1920 has been that of mass education. As early as 1919, the attention of the Conference was directed toward music for everybody by the President, in an address in which he stated: "Every child should be educated in music according to his natural capacities, at public expense, and his studies should function in the life of the community."[8] This objective found expression in the slogan, publicized especially in the decade after 1925, "Music for Every Child; Every Child for Music."

The activities of Conference members have been influenced by the mass education motive until the present. During World War II, in particular, they stressed the active participation of all in music, not only as a means

[5]C. A. Fullerton, "The Responsibility of the Normal Schools for the Musical Equipment of the Grade Teacher," *MSNC Journal of Proceedings* (Rochester, N. Y.: The Conference, 1913), pp. 44-47.

[6]W. Otto Miessner, "Music's Place in the Public School System," *MSNC Journal of Proceedings* (St. Johnsburg, Vt.: The Conference, 1918), pp. 53-57.

[7]National Council of Education, "Economy of Time in Education," *Journal of Proceedings and Addresses of the Fiftieth Annual Meeting of the NEA* (Ann Arbor: The Association, 1912), pp. 507-517.

[8]Osbourne McConathy, "President's Address," *MSNC Journal of Proceedings* (Bloomington, Ill.: The Conference, 1919), p. 11.

of developing patriotism, but with the idea of including the entire school population. In recent years, driven by the ideal that every child should be educated in music, many music teachers have cast anxious looks at the statistics that reveal that not all pupils, by any means, participate in the music offerings of high schools.

The dominant factor in educational philosophy today is the desire to secure equalization of educational opportunity for all children in the nation. There are two meanings to the term "equalization"; the first, for most persons, is that equalization is found in the length of the school term, facilities, and quality of instruction. This meaning is stressed by the public and the press, and among many professional educators. Upon it are based the equalization programs of the state and federal governments. The Conference, too, has held to this definition of the term in many of its discussions and reports.

The other meaning, held by some educational leaders, is broader. It is an attempt to widen the horizon and to extend the base of the curriculum, with the aim of the development of the individual as a member of society. It would be accomplished by changing the curriculum from a "subject centered" position into one which is "child centered."

Music educators in the past few years have been swinging toward the latter view. Lilla Belle Pitts and James L. Mursell have been particularly instrumental in developing the second concept in the field of music education. The theme of the 1941-1942 biennium, under the presidency of Miss Pitts, "Broadening Horizons for Music Education," was typical of the change in thought. The curriculum studies of the past several years, although still dominated by the mass education idea, have been veering into closer conformity with the second meaning of the equalization philosophy. The developing interest in general education, throughout all phases of American education, is another aspect of the same concept; the music teachers have been thoroughly conscious of the thinking in this area.

Music in Relation to Large Educational Movements

Music education was affected by the major movements in the field of education, and, again, the Conference activities reflected such interests. Among important educational movements were those of testing, child study, the activity centered curriculum, the establishment of the junior high school, and general education.

The testing movement gained momentum as a result of the publication of the studies on the efficiency of teaching as reported by the Committee on the Economy of Time in Education. As early as 1912, the intensified studies made by psychologists were arousing the interest of music teachers.[9] It was at the meeting of that year that Carl E. Seashore first presented a report on the beginnings of his work in the measurement of musical capacity.[10]

The great impetus given mental testing by the work of the psychologists in the Army during World War I

[9]Karl W. Gehrkens, "The Value of Psychology to the Music Supervisor," *MSNC Journal of Proceedings* (St. Louis: The Conference, 1912), pp. 36-42.

[10]Carl E. Seashore, "Measurement of Musical Capacity," *MSNC Journal of Proceedings* (St. Louis: The Conference, 1912), pp. 58-69.

was reflected in the 1919 meeting.[11] Here, Seashore presented his tests for the discovery of musical talent.[12] His report resulted in the further intensification in the development of music tests, and there soon appeared a number of prognostic and achievement tests.

By 1924, the testing movement had reached such intensity that a regular department on the subject was established in the *Journal,* under the editorship of Peter W. Dykema. Six to eight pages of each issue were devoted to the discussion of tests and measurements. The department remained a regular feature of the *Journal* until 1932. Thereafter, occasional articles appeared on the subject.

The survey movement was a part of the testing movement in education, and music educators participated in the activity to a marked degree. One of the earliest reports on a survey made under the auspices of the Conference was that on school music credits,[13] presented to the 1915 meeting. Thereafter, numerous surveys were conducted by committees of the Conference and by the Research Council. Examples of such studies were those carried on by the Commission on Costs and Economic-Social Values of Music Education, and numerous surveys on the status of music in the schools made by committees on instrumental and vocal affairs.

One of the outgrowths of the testing movement was the emphasis put upon the study of the individual child and his needs. From about 1924 on, articles on this phase of education appeared in the *Journal* with greater frequency, and increasing numbers of papers and discussions appeared on the programs of the meetings.

In spite of the stress laid upon the individual child and his needs, however, the greater number of music educators, particularly at the high school level, remained interested in the development of performing groups, paying little heed to the non-performer. Perhaps the music educator should not be judged too harshly for stressing the training of his bands and choirs. In too many cases, he was, and still is, in a position analogous to that of the football coach, in that he must produce a spectacular band, chorus, or orchestra, or lose his job. In far too many cases, the rank received in a music contest determined whether his contract was renewed. Too, the performance is an overt demonstration of his teaching, easily judged by all as to its quality, or at least its effectiveness. Hence, when he is confronted with the large task of producing groups that must appear frequently in public, it is understandable if he neglects the less talented, nonperforming pupil. To understand is not necessarily to forgive in such a case.

A more subtle failure was recognized and condemned by the Council of Past Presidents, when they said:

> Specifically, again, we should endeavor to distinguish between education, as defined in its terms of subjective growth for all pupils, and effort that may be more accurately classified as demonstration, propaganda, or promotion . . . . Its [the Con-

[11] R. N. Sylvester, "Practical Possibilities of Applying Psychology as Exemplified in the Building of the Army," *MSNC Journal of Proceedings* (Bloomington, Ill.: The Conference, 1919, pp. 28-29.

[12] Carl E. Seashore, "Procedures in the Discovery and the Encouragement of Musical Talent," *MSNC Journal of Proceedings* (Bloomington, Ill.: The Conference, 1919), pp. 30-41.

[13] Osbourne McConathy, "School Credits for Music Study," *MSNC Journal of Proceedings* (Lincoln, Neb.: The Conference, 1915) pp. 90-99.

ference's] crown must not lose sight of its roots, which are in the lowly but lovely soil of youthful potentialities. The true product is not that which greets the audience, but is that which slowly gathers in the minds and feelings of the producers.[14]

The activity movement in elementary education gained momentum during the decade of the twenties. Frank A. Beach helped focus the attention of the Conference members on what he called the "new education" at the 1922 meetings.[15] From about 1925 on, music educators became increasingly aware of the possibilities of the use of folk dances, rhythm orchestras, creative expression, and singing games in their teaching. They became more aware of the necessity of correlating music experiences with other subjects in the curriculum, notably physical education, English, art, and the social subjects.[16]

Leaders in education appeared before the meetings and emphasized various aspects of the activity movement and music's relationship to them.[17] In 1930, the Conference adopted a course of study for the grades, which emphasized much correlation with units of work and projects carried on in the activity school.[18] Leading music educators published works on music in the activity movement as interest in the trend developed.[19]

The establishment of the junior high school also caused much thinking on the part of music educators. The first Conference program on which music in the junior high school was featured was that held in 1921.[20] In 1925, the Research Council presented its report on its studies on this phase of school music.[21] Thereafter, papers and discussions on junior high school music that interested Conference members included such topics as course content, objectives, and methodologies. Interest in this phase of music education had grown to such an extent by 1928 that a sectional meeting was devoted exclusively to the subject at the Conference of that year.

One of the more recent movements recognized in Conference deliberations and *Journal* articles is that toward general education. Much discussion and debate has taken place on an exact definition, if one is possible, of general education, and music's place in it. The debate has led from such concepts as that of basic and essential education for all to that of clarification and development of the qualities of experience, and the best methods of achieving such qualities.

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[14]Will Earhart, "Resolutions," *Yearbook of the MSNC* (Chicago: The Conference, 1932), p. 327.

[15]Frank A. Beach, "President's Address — Music and the New Education," *MSNC Journal of Proceedings* (Ann Arbor, Mich.: The Conference, 1922), pp. 22-25.

[16]Russell V. Morgan, "New Phases of Music Education in the Elementary School," *MSNC Journal of Proceedings* (Chapel Hill, N.C.: The Conference, 1930), pp. 127-130.

[17]Harold Rugg, "Musical Education and the Development of Personality," *MSNC Journal of Proceedings* (Chapel Hill, N.C.: The Conference, 1930), pp. 32-38.

[18]Leonora Coffin, "Report of the Subcommittee on Music Appreciation for the First Six Grades," *MSNC Journal of Proceedings* (Chapel Hill, N. C.: The Conference, 1930), pp. 229-245.

[19]For example, Will Earhart, *The Meaning and Teaching of Music*, Chapter XV (New York: W. Witmark and Sons, 1935). Lillian Fox and Thomas L. Hopkins, *Creative Music* (New York: Silver Burdett and Co., 1936).

[20]Helen M. Garvin, "What Should the Junior High School Mean to Teachers of Music?" *MSNC Journal of Proceedings* (Providence, R.I.: The Conference, 1921), pp. 49-54.

[21]Will Earhart, "Music in the Junior High School," *MSNC Journal of Proceedings* (Tulsa, Okla.: The Conference, 1925), pp. 267-288.

Aims of Music Education

The aims of music education have been of recurrent interest on the part of speakers before the Conference. Only some of the major positions taken by the leaders in the field can be presented in this short study.

The first statement on the aims of music education in the schools by speakers before the Conference reflected the trend away from formalism toward usefulness, and from skill toward content. The educational world was receiving the impact of such trends about 1914; at that time, Peter W. Dykema pointed out that a wise subject for investigation was the ultimate aims which should be reached by music education.[22] The following year, the Conference spent a considerable portion of the meeting in the discussion of such goals.[23] Some of the points brought out were far reaching in their foresightedness.

Karl W. Gehrkens, who led the discussion, formulated a statement which could be considered the consensus of the thought of the group. It read, in part,

> The ultimate aim of music teaching is to cause children to know, to love, and to appreciate music in as many forms as possible, and thus to bring added joy into their lives and added culture into their natures . . . . Technical aspects of musical study must never be allowed to interfere with the legitimate working out of those emotional and esthetic phases of music which constitute the real essence of the art . . . . It is the art side of music with its somewhat intangible influence which we are trying to cultivate rather than the science side with its possibilities along the mental training line and its more easily classified results.[24]

In 1923, Gehrkens, in his President's Address, further amplified the aims of music education in saying,

> The function of school music is to cause the rank and file of our boys and girls to maintain, if possible to increase, the interest which they felt when they first heard and took part in music; and to give them suitable opportunities for growing constantly more appreciative and more intelligent when listening to good renditions of standard music. It also should fit them to take such part in the rendition of good music as their varied capacities and inclinations may make possible and desirable.[25]

At the same meeting, the importance of the development of appreciation as a major aim in music education was stressed.[26]

By 1930, the aims of music educators had crystalized to such an extent that they were set forth in a statement of beliefs and purposes in the April issue of the *Journal*.[27] The statement was the result of the combined efforts of the Research Council, the Executive Committee, the Board of Directors, the Council of Past Presidents, and the presidents of the sectional conferences. It not only presented the aims of the music teachers, but suggested a broad and constructive program as a means of attaining the goals. The statement was revised and

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[22]Peter W. Dykema, "Efficiency in Music Teaching and Practical Tests of the Same," *MSNC Journal of Proceedings* (Minneapolis, Minn.: The Conference, 1914), p. 53.

[23]"Ultimate Aims in Public School Music Teaching," *MSNC Journal of Proceedings* (Lincoln, Neb.: The Conference, 1915), pp. 55-76.

[24]"Ultimate Aims in Public School Music Teaching."

[25]Karl W. Gehrkens, "Some Questions," *MSNC Journal of Proceedings* (Tulsa, Okla.: The Conference, 1923), pp. 28-38.

[26]Davis Snedden, "The Future of Music Education in Public Schools," *MSNC Journal of Proceedings* (Tulsa, Okla.: The Conference, 1923), pp. 45-53.

[27]"Statement of Beliefs and Purposes," *Music Supervisors Journal, 17* (April 1930), 13.

simplified at the 1940 meeting in Los Angeles.[28] In 1946, the Conference adopted a declaration of faith, purpose, and action, which further implemented the statement.[29] It stressed the importance of music teaching as an exponent of democratic processes, the broadening scope of musical experiences, the value of music in international cultural relationships, and the need for the provision of musical experiences for the non-performer.

Curriculum Changes in Music Education

Major curriculum changes that occured in music education as reflected in the Conference included the changing concept of music from a skill subject to emphasis on the content of music courses, the expansion of the curriculum, the movement toward correlation of music with other subject matter fields, and the developments in teaching the appreciation of music.

The first conference held in Keokuk was called for the purpose of demonstrating a new method of teaching the reading of rhythm in music. Such an interest in new methods and devices was a distinguishing feature of all subsequent meetings. Thereafter, the Conference was involved in many heated arguments on methodologies; only later did the realization come that aims, purposes, and content were far more important than were the devices for teaching more or less isolated aspects of music.

One such conflict was that concerning the relative importance of sight-singing. It raged for several years around 1911. One group of music teachers insisted that the teaching of the ability to read music was the most important goal of school music, an insistence that was a carry-over from the days of the old singing school. The other group insisted that sight-singing should be a means to the end of developing musicianship and an appreciation of music. Not for several years did the latter group win its point; even today, however, echoes of the argument are heard in discussions and in articles in the *Journal*.

The same conflict has persisted, in an expanded form, throughout the history of the Conference. One group of music educators has been interested in performance skills, almost to the exclusion of any other aim, as exemplified in contests, excellence of technique, and high quality of performance as an end in itself. The other group[30] has been interested in the use of music in the education of the whole child, and his integration into society.

Another concern of the Conference members from its first meeting was the struggle to achieve recognition of music as an integral part of the curriculum, on an equal status with all other subjects. The acceptance of music credits for graduation and for college entrance was stressed both in discussions and in studies made by Conference committees and by the Research Council. As music credits were increasingly accepted, the music teachers became more and more interested in the possibilities of expanding the curriculum.

After 1922, when the Committee on

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[28]"Statement of Belief and Purpose," *Music Education Source Book* (Chicago: The Conference, 1947), p. iv.

[29]Council of Past Presidents, "A Declaration of Faith, Purpose, and Action," *Music Supervisors Journal, 33* (April, 1946) 16-17.

[30]As exemplified in James L. Mursell, "Some Fundamental Principles of Music Instruction," *MSNC Journal of Proceedings* (Ithaca, N. Y.: The Conference, 1930), pp. 99-105.

Instrumental Affairs began to function, expansion of the curriculum was achieved by the addition of instrumental music activities. Thereafter, other phases of music instruction were added, including voice classes, ensembles, conducting, theory, instrumentation, and the like, in the larger high schools. A similar growth in variety of music activities occurred in the elementary schools, as has been pointed out above.

Following World War II, the Conference became engrossed in a large number of curriculum studies, designed to enlarge the importance and the social use of music as it is taught in the schools. An investigation of this phase of curriculum development is too involved for the limits of the present paper.

Another subject of interest to music educators was the study of music in relation to other subject areas, and the integration of music into the lives of the pupils. During the economic depression that began in 1929, there was considerable public discussion of alleged "fads and frills" in education. Music was in certain cases regarded as falling into this category. In some school systems, teachers of music were transferred to other teaching assignments and music was dropped as a separate field of instruction. In justification for the curtailment of the music program, it was claimed that music could and should be completely integrated with other subjects.

The leaders of the Conference became very concerned about this trend. The Council of Past Presidents, acting in the capacity of the committee on resolutions, stated at the 1934 meeting that,

> We endorse the general principle of correlation, but we reserve the right to devote most of the regularly scheduled periods to teaching music for its own sake, simply because it is beautiful and because participation in music brings about moods of exaltation that are good for human beings to experience.[31]

Again, in 1936, the Council pointed out that,

> Current educational thought is emphasizing *integration* as a means of unifying the educational experiences of children . . . . We believe that music should serve human needs in every possible way, and are desirous that it co-ordinate with the social sciences and other activities . . . [but] . . . we deplore the tendency toward making music lose its identity among cultural subjects, because we believe that its greatest power lies in its intrinsic feeling and beauty. . . . The values peculiar to music should be safeguarded whenever music is integrated with any other subject.[32]

Another statement was made in 1938, when the Council again returned to the subject, saying,

> The Conference is not unaware of modern educational trends, and as intelligent educators we are naturally in sympathy with the fundamental principles of correlation and integration. But we know that if music is to function as a vital force, in enriching the curriculum, opportunity must be provided for the study of music *per se* . . . . We urge school administrators that they provide time in the school day for the practice of music as an art.[33]

As economic conditions improved, the pressure became less strong to economize in educational expenditures by eliminating music and other so-

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[31]Karl W. Gehrkens, "Resolutions," *Twenty-Seventh Yearbook, MENC* (Chicago, Ill.: The Conference, 1934), pp. 300-301.

[32]Russell V. Morgan, "Resolutions," *Twenty-Ninth Yearbook, MENC* (Chicago: The Conference, 1936), p. 404.

[33]Karl W. Gehrkens, "Resolutions," *Thirty-first Yearbook, MENC* (Chicago: The Conference, 1938), p. 435.

called special subjects as distinct curricular areas.

However, in recent years educational thinking has been veering again toward more integration as exemplified in the self-contained classroom, and the emphasis upon the teaching of music by the regular classroom teacher. Again, the trend is a result not only of the development of educational principles, but because of the need for more economy in both money and time; in money, because of the tremendous increase in school population and its resultant shortage of facilities and instructional staff, and in time, because of the increasing demands of other curricular areas.

The interests of music educators in the teaching of music appreciation closely paralleled the stages in the teaching of literature, which Leonard describes as follows:

> The teaching of literature passed through three stages. The first emphasized "select readings"—short selections from a large number of authors. The second was a study of the history of literature, consisting chiefly of a biography of authors and a list of their works. The third stressed the study of the "classics" with the emphasis either on a wide extensive reading of many selections or upon the intensive reading of a few masterpieces. In 1930 the chief aims of teaching literature seemed to be to acquaint the pupil with good reading material, to broaden his interests, and to develop taste and standards of evaluation for his continued reading.[34]

The parallel to the first stage can be found in the selection of materials for study by the Conference committees on music appreciation. The second stage can be seen in the emphasis put upon the biographical sketches of the composers which were the inevitable corollary of every appreciation lesson of the 1920's. The third stage can be seen principally in the selection of materials for use in the festival-competitions sponsored by the Conference. Most of these compositions could be termed "classic."

In 1930, closely paralleling the trend in the field of literature, the Conference committee on appreciation stressed in its report that,

> An outstanding aim of the listening period is to provide a rich musical experience through acquaintance with music literature of worth . . . [which] will also provide a model interpretation . . . develop correct attitudes toward good music, and will establish the habit of preferring good music.[35]

In 1932, the Conference conducted a national discrimination contest, which stressed taste rather than knowledge about music. The development of taste and discrimination has remained a paramount aim of the teaching of music appreciation since that date.

Summary

Major trends in American education are undoubtedly reflected in every field of instruction, and music education is no exception. The Music Educators National Conference has provided a channel through which influences from the main stream of educational development may flow and modify the course of music education.

The early motives for American education, although no longer dominant, continue to influence the work of the schools, including the program in music education. The religious motive of colonial days is recalled by the close link between school and

[34]Paul J. Leonard, *Developing the Secondary School Curriculum* (New York: Rinehart and Co., 1946), pp. 50-51.

[35]Leonore Coffin, "Report of the Committee on Appreciation," *MSNC Journal of Proceedings* (Ithaca, N. Y.: The Conference, 1930), p. 229.

church music. In three-quarters of a century following the American Revolution, the nationalistic motive was strong. It has continued to find expression in the content of school music, especially during World War II. The conflict of ideals between nationalism and the concept of universal brotherhood has been recognized in Conference discussions before, during, and after the war. A third motive, the utilitarian, was dominant when the Conference was organized in 1907. For some years after that date music educators were much concerned with "standards" and "efficiency," and were fearful lest their subject be regarded as making no contribution to economic progress.

More recently the American people have developed a strong desire that education be provided for everyone, and that educational opportunities be equalized. Beginning in 1925, the Conference publicized the slogan "Music for Every Child; Every Child for Music." Under the leadership of Lilla Belle Pitts, James L. Mursell and others, many music educators have attempted more and more to make their program "child centered" rather than "subject centered."

Among the movements in education which have been prominent in the five decades of the Conference are those for testing and measurement, for school surveys, for the study of individual children, for an activity program in elementary education, and for the development of junior high schools. The following statements suggest that each of these movements is significant for music education: (1) Seashore's measures of musical talent were among the first aptitude tests to be given wide-spread trial. His work was early reported to the Conference, and much space in the *Journal* has been given to problems of measurement. (2) Many surveys of practice and of opinion have been made under the sponsorship of the Conference; the Research Council in particular has conducted such studies. (3) The needs of individual pupils in music education have been increasingly recognized in the discussions and literature of the Conference. (4) The correlation of music with activity units in elementary schools is advocated in committee reports of the Conference and in writings of Conference leaders. (5) The junior high school movement has called attention to the problems of adolescents. Music instruction for pupils in junior high schools has been discussed repeatedly in Conference sessions and in its publications.

One function of professional organizations is to give direction to the work of its members, through the development of clear concepts as to aims and objectives. As early as 1914, the Conference began to formulate statements on aims in music education, and official declarations on this subject were issued by the Conference in 1930, 1940, and 1946.

In the curriculum field, the Conference has exerted influence, as in most professional areas, through providing a forum for discussion, through committee work, and through its publications. Among the trends to which the Conference has contributed are: greater emphasis upon music as part of child life rather than as a subject in which a high level of skill is to be the prime objective; expansion of the music curriculum; correlation and integration of music with other subjects; and the growth of music appreciation as an objective of instruction.

Longwood College

History of Bela Bartok's *Mikrokosmos*

BENJAMIN SUCHOFF

I

BELA BARTOK'S *Mikrokosmos*, a collection of 153 progressive pieces and 33 exercises for the piano, is attracting more and more attention since its publication in 1940. Indeed, more than 40 articles, books, and theses in whole or in part are devoted to a discussion of the work, particularly from the point of view of its objectives: first, to provide pianists with pieces suitable for concert use; second, to teach pianists, young or old, the technique and musicianship of the instrument from the beginning to a certain higher degree; third, to acquaint pianists with music written in different styles; fourth, to introduce piano students to folk music by means of graded transcriptions; and fifth, to serve as a reference book for students of composition. The present article is an account of certain events which took place before, during, and after publication of the *Mikrokosmos* and is based on a chapter in the writer's doctoral dissertation.[1]

II

Bartók's resumption of his concert career in the 1920's, expanded to an international scale, was perhaps the cause of his increased activity in the composition of piano music. 1926 was the year in which he wrote the *Sonata for Piano, Out of Doors,* and *Nine Little Piano Pieces,* and began the collection of piano pieces eventually called *Mikrokosmos*.[2]

Verification of 1926 as the year in which the *Mikrokosmos* originated can be found in two documents containing Bartók's handwriting. One, a *tires-a-part* from Denjis Dille's biography of the composer,[3] contains Bartók's autographic additions and corrections to what is apparently the first published chronological catalogue of his works in which the *Mikrokosmos* is listed.[4] The other, titled "List of all noticed errors in piano score of Violin Concerto," is in part a request from Bartók to his publisher (Boosey and Hawkes, London) to change the entry concerning the *Mikrokosmos* (printed on the back cover page of the Concerto) as follows:

> . . . piano solo . . . last item: omit (1940), or substitute (1926–1939) for it.[5]

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[1] "Béla Bartók and a Guide to the *Mikrokosmos*," unpublished doctoral dissertation (School of Education, New York University, 1956).

[2] Halsey Stevens, *The Life and Music of Béla Bartók* (New York: Oxford University Press, 1953), pp. 61, 68.

[3] Denjis Dille, *Béla Bartók* (Antwerp: N.V. Standaard-Boekhandel, 1939), pp. 89-91.

[4] A photostatic copy of the pamphlet is on file at the Bartók Archive in New York City. The date listed for the *Mikrokosmos* is 1926-1937.

[5] MS. File, Bartók Archive. The writer has been active since 1954 in a research capacity in the Béla Bartók Archive which was established by Victor Bator, Trustee of the Estate of Béla Bartók, 30 East 72nd Street, New York, N.Y., to collect and preserve all works by and about Béla Bartók. Further information about the Archive and its services to researchers can be obtained from the Trustee.

Which one of the 153 pieces comprising the *Mikrokosmos* was composed first is a matter of conjecture; the evidence, however, seems to indicate *Unison* (no. 137)—and this can be quite conclusively attributed to having been composed in 1926.

Bartók catalogued most of his manuscripts numerically, assigning the number 32 (printed with green crayon on the title page) to a thirty-one page manuscript containing sketches and second (intermediary) drafts of *Nine Little Piano Pieces,* incomplete sketches of unidentified piano music, and one sketch each from *Out of Doors, First Piano Concerto,* and *Mikrokosmos.*[6] The original title on the cover page was written in pencil: *kis zongoradarabok* (little piano pieces) and above it, in bright blue ink, the following:

> 9 Kleine Klavierstücke (Skizzen)
> (einige Skizzen zu "Mikrokosmos"
> "Im Freien" I. Klavierkonzert)

The entire manuscript was neatly written first in blue-black ink with a narrow pen and later corrected in pencil. The twenty-fifth page contains a continuation of the second *Dialogue* (no. 2 of *Nine Little Piano Pieces*) on the first four staves. The remainder of the page consists of a sketch of *Unison* (*Mikrokosmos*: no. 137) completed in two operations: first, an outline of the piece was written in the same color ink and the identical penmanship as that of the other pieces comprising the complete manuscript; then corrections, additions, and extensions were made in blue ink with a broad pen and with an autography considerably less neat in appearance. In fact, the revisions of *Unison* are identical in terms of ink, pen, and handwriting to those sketches contained in manuscript no. 49 (*Mikrokosmos Klavierstücke, Brouillon*) which are the first drafts of *Mikrokosmos.*[7]

Logically, it is not unlikely that Bartók composed the preliminary (then unfinished) sketch to *Unison* as part of a collection of piano pieces intended for publication in 1926.[8] For one reason or another, perhaps because of his preoccupation with the composition of *Out of Doors* or the *First Piano Concerto* that same year, he decided to submit for publication under the title of *Nine Little Piano Pieces* those sketches he had completed, and he returned to the manuscript at a later date to finish the sketch to *Unison.* Incidentally, this piece is not included in manuscript no. 49.

Mátyás Seiber suggested that Bartók's conception of *Mikrokosmos* as a title [9] or as a collection of pieces with a pedagogical purpose did not occur prior to 1933.[10]

> I possess no letter from Bartók myself on the subject of "Mikrokosmos," but I feel myself connected with this work in a small way of which I am rather proud.
>
> In 1933 I wrote a series of short piano pieces which were published by Schott, Mainz, under the title "Rhythmic Studies." The pieces dealt with various rhythmical problems like "Syncopation," "Shifting of Accents," Cross-Rhythms," etc., and were mainly devised for teaching purposes. As usual, after publication I sent a copy of

[6] *Loc. cit.*

[7] The file number of this manuscript in the Bartók Archive is 59S1. There is no apparent relationship between the other incomplete sketches in manuscript No. 32 and the *Mikrokosmos* as finally constituted.

[8] He completed *Nine Little Piano Pieces* on 31 October 1926, in Budapest, and they were published by Universal-Edition A.G. (Vienna) in 1927.

[9] From the Greek: *mikros kosmos,* "little world."

[10] Mátyás Seiber, in a letter to the investigator, 9 October 1954. A pupil of Kodaly and friend of Bartók, Seiber now resides in England.

it to Bartók, together with my "Easy Dances," published shortly before. Years later when I met Bartók again (I think it must have been in London in 1938) I asked him what he thought of my Rhythmic Studies.

He congratulated me warmly, saying what excellent teaching material they were,[11] then continued: "In fact, I took up your idea and expanded it further: I am now working on a series of piano pieces which deal not only with the rhythmic, but also with melodic, harmonic and pianistic problems." This series was to become the *Mikrokosmos*.[12]

Bartók's unpublished lecture notes contain information in support of Seiber's contention. After referring to *For Children* (composed 1908–1909) as easy pieces written for piano students, Bartók said, "More than twenty years later I again turned to this problem. But now I approached the work with a very definite plan. My idea . . . is entitled *Mikrokosmos*."[13]

According to a statement made by Peter Bartók, his father's first reference to the title *Mikrokosmos* and his first assertion that the collection of pieces under that name constituted a piano method was made in 1936.

I served as a "guinea pig" in my father's experiments with the *Mikrokosmos*, in 1936, the first year I began piano study; in fact, he wrote the pieces faster than I could learn them. Then he composed the *Mikrokosmos* independent of any consideration of its suitability for me.[14]

A Bartók pupil showed the writer tissue proofs[15] in Bartók's autograph of several pieces from the *Mikrokosmos* which the composer presented to her during the 1936–1937 school year in Budapest. She said that Bartók referred to the pieces at that time as teaching materials from a collection called *Mikrokosmos*.[16]

One of Bartók's former teacher-colleagues in Budapest disclosed that the composer asked for her assistance in the preparation of certain volumes of the *Mikrokosmos*:

Since he had never taught beginners himself, the composer honored me repeatedly by asking for my suggestions concerning the musical and technical problems to be solved in the early grades. While we discussed sundry details of the pieces included in the first three volumes, what struck me most was not the systematic way in which he reached the solution of each problem, but his keen sense of responsibility towards the pupil whose progress he wanted to serve.[17]

On February 9, 1937, Bartók played the first performance of pieces from the *Mikrokosmos* at Cowdray Hall, London, and accompanied the violinist Zoltán Székely in the Bartók *Sonata for Violin and Piano* and the *Second Rhapsody for Violin and Piano*.[18] He wrote to Székely less than a month before the concert: "A program loquacious enough! But at least these many pieces are all 'manuscript'."[19] A few days after the occupation of

[11]Peter Bartók, in his interview with the writer on 28 July 1954, reported that his father taught him popular pieces composed by Seiber. "We played foxtrots, rhumbas, and so forth, as duets in which my father improvised a bass part."

[12]Seiber, *op. cit.*

[13]Documentary File, Bartók Archive.

[14]Peter Bartók, in an interview with the writer, 28 July 1954. On the back cover of the jacket to the BRS recording of *For Children* (#919) he further states: ". . . the ink hardly dried on some when I started practicing them."

[15]A term used in the Bartók Archive to designate reproductions made from transparent masters by a photographic process.

[16]Dorothy Parrish, interview with the writer, 17 April 1955.

[17]Margit Varró, unpublished paper read at the Wisconsin Conservatory of Music, 29 September 1950. Another unpublished paper, "Contributions to Béla Bartók's Biography," was presented to the Midwest Chapter of the American Musicological Society in March 1949, and contains a similar statement.

[18]Program File, Bartók Archive.

[19]Stevens, p. 83.

Vienna in 1938, Ralph Hawkes flew to Budapest and met with Bartók:

> There was certainly no reticence on Bartók's part in agreeing to publish all his future works with us (Boosey and Hawkes). He had several manuscripts in preparation, such as the *Sonata for Two Pianos and Percussion* and *Mikrokosmos*, which were partly done, . . .[20]

The Bartók file of the London office of Boosey and Hawkes, consisting of more than 200 letters and other documents, contains the correspondence between Bartók and Ralph Hawkes (and other members of the company) concerning the preparation of the *Mikrokosmos* for publication. The composer's letters were written for the most part from his home in Budapest and are dated from May, 1938.[21]

The interchange of letters begins with an invitation from Hawkes to Bartók for the latter to appear at one of "the intimate little Concerts we give in our Organ Studio here in London."[22] Bartók's reply states, "Of course I am with pleasure at your disposal and would play at your concert some of my piano pieces from 'Mikrokosmos'."[23] Less than a week later Bartók sent the following program to Hawkes:

> From "Mikrokosmos" (piano pieces): Tale;/ Wrestling;/ Major seconds broken and together;/ Minor and Major;/ Theme and inversion;/ Boating;/ Burlesque rustique;/ Chords of the Fifth;/ From the Isle Bali;/ Merry Andrew;/ Five dances in "Bulgarian" rhythm.
>
> This takes approximately 20 minutes.[24]

The publisher's answer to the foregoing letter informs Bartók that the concert would be given at five o'clock in the afternoon on June 20, 1938.[25]

In what seems to be an office memorandum, the following statement appears: "Among his new works, the Studies for Piano "Microcosmos" would be the most important for us . . ."[26]

No further reference to the *Mikrokosmos* is made in the correspondence until early in 1939, the year in which Universal-Edition released Bartók from his publishing agreement with them. On March 6 Hawkes wrote to Bartók that he was ready to publish all the new works the composer had ready.

> Mrs. Hertzke, who called to see me the other day, tells me that you have a School for Piano in preparation. This work will, of course, be very interesting indeed but I do not recall that you told me anything about it when I had lunch with you.

Bartók's reply, sent from Basel on the ninth of March, states,

> That piano-school is nothing else than *first part of* the "Mikrokosmos";[27] In fact, it will be something like a school, with exercises, progressive order of the (very easy and easy) pieces. If you prefer to have it more similar to a School, I could add to it some changements.

The publisher then informed Bartók that a "strict Piano School in such a form" was not actually wanted, that

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[20]Ralph Hawkes, "Béla Bartók: A Recollection by His Publisher," *A Memorial Review* (New York: Boosey and Hawkes, 1950), p. 17.

[21]Correspondence File, Bartók Archive.

[22]Letter dated 29 April 1938.

[23]Letter dated 8 May 1938.

[24]Letter dated 13 May 1938.

[25]Later changed to 3 P.M.

[26]The document is undated and unsigned. The wording of the memorandum suggests that it was perhaps written by Ralph Hawkes. The reader will note that the *Mikrokosmos* is here referred to as "studies."

[27]The italics are the writer's insertion to indicate that the three words were not part of the original sentence but later added to it. Thus, it seems reasonable to conclude that the *Mikrokosmos* in its present published form as a piano method was not Bartók's original conception when he composed certain of its pieces.

the former wished to go ahead with the publication and not wait for the "absolute completion" of the composer's idea, and that individual pieces from the *Mikrokosmos* could be incorporated into a school at a later date.[28]

It seems likely that at this time Bartók discarded any ideas he might have had concerning the publication of the *Mikrokosmos* as piano pieces, *per se,* according to the following letter mailed from Budapest:

Mikrokosmos. It is absolutely important to add still 20 or 30 very small and very easy pieces, to write them will not take much time. Besides, I want to transcribe most of the easier pieces for 4 hands, and to insert before some of the (easier) pieces presenting a new technical problem, a respective study (*Fingerübung*)—all that for pedagogical reasons . . .[29]

The letter continues with a suggestion that certain pieces could be published with pictures "only if the pictures are very good and original" (such as that of a web in no. 142, *From the Diary of a Fly*).[30]

Hawkes agreed with Bartók's proposals, particularly with reference to the use of sketches in illustration of the *Mikrokosmos,* voiced the opinion that publication might be possible in the early part of 1940, and suggested that if Bartók could not secure the services of an artist in Budapest he should come to London and confer with one there.[31] Bartók replied that he had no "occasion or possibility to come to England" before his next concert tour in November or December, 1939, "so I can't see the gentleman you will choose for the sketches."[32]

In another letter, Bartók states that "I will send you a copy of the incomplete Mikrokosmos in a few days. I am very busy now in filling all the gaps still existent in it and have written ca 30 new pieces, but these are not yet copied. Now the whole work is almost complete . . ."[33]

On June 17, 1939, Bartók wrote that he was sending the *Mikrokosmos* pieces the order of which was "more or less pêle-mêle (given by haphazard)."

The definitive order will be according to difficulty. My idea is to have them published in three volumes (you must not forget, there will be some 30 or 40 more of them!): I. the easiest pieces (intended for the 1. and 2. year), II. the less easier pieces, III. the more difficult ones. The I. volume should be printed in bigger characters (this is better for beginners) than the II. and III.[34]

After he received the manuscript of the *Mikrokosmos,* Hawkes engaged the services of an artist and sent several sketches to Bartók for approval.[35] The composer found them to be "too confusing for children" and suggested that they should be redrawn in terms of "the children's eyes." In the same letter he adds, "As for a new work, you know I want to score some of the Mikrokosmos pieces . . . I hope this will be ready perhaps end of Oct., . . ."[36]

Hawkes assured Bartók that the sketches would be improved, and suggested that there should be a preface of some kind in each of the four volumes planned for publication which would explain the various pieces and

[28]Letter dated 6 April 1939.
[29]Letter dated 17 April 1939.
[30]*Loc. cit.*
[31]Letter dated 25 April 1939.
[32]Letter dated 3 May 1939.
[33]Letter dated 13 June 1939.
[34]Bartók also suggested that not all pieces should have sketches and that the illustrations should be in Vol. I for the most part.
[35]Letter dated 29 June 1939.
[36]Letter dated 8 July 1939.

give an indication of the whole series. He enclosed an article about the *Mikrokosmos* written by his assistant, Dr. Ernst Roth (intended as advance publicity), for Bartók's criticism.[37] Bartók returned the article with his remarks inserted therein, and he wanted to knew whether it was intended for publication in the Boosey and Hawkes publication *Tempo*.[38] Hawkes replied that "the article on "MIKROKOSMOS" is intended not only for general publicity purposes but also as a pamphlet to be issued with the works when they are published and I take it you approve of it."[39]

On November 2, 1939, Bartók informed Hawkes that the *Mikrokosmos*, consisting of 153 pieces, was ready except for the Preface and the "footnotes" to some of the pieces.[40]

On November 23, 1939, Hawkes reported that he had received the complete *Mikrokosmos* manuscript and that he would write again within a few days concerning the progress made towards its publication. It was not until December 9, however, that a rather lengthy letter was mailed to Bartók which suggested that the sketches planned as illustrations for certain pieces should be eliminated, and that sales factors might necessitate the division of the first volume (containing 66 pieces) into two parts with a resulting publication of six volumes in all. The letter also noted errors in nos. 8, 38, 66, 102, 120, 142, and 143 for Bartók's correction, and stated that the composer's preface to *Mikrokosmos* did not give sufficient information or detail, "and will be what we call 'sales resisting', unless it is done in a much more simple and easy manner . . . I am proposing to send you a revised preface at an early date which I think will meet this purpose." Hawkes further stated that a subtitle was required which would give an indication on the cover page as to the general contents of the series.

Bartók accepted Hawkes's proposals, requested the publisher to send subtitles in English which he, Bartók, would translate into Hungarian, and he corrected the noted errors.[41] Bartók's comments concerning no. 142 (*From the Diary of a Fly*) are perhaps worthy of inclusion here:

> No. 142: "jaj, pókháló!" means "Woe, a cobweb!" I wanted to depict the desperate sound of a fly's buzz when getting into a cobweb. Now, I don't know, if we use three languages for this explanation, the joke will be spoilt. Will you kindly decide, what to do here. We may leave out these words.[42]

The publisher then notified Bartók that future production problems concerning the publication of the *Mikrokosmos* would be handled by Dr. Roth and Mr. Stein of the London office, since he, Hawkes, was leaving for a three or four months stay in America.[43]

The problem of selecting a suitable subtitle for the cover page was discussed by Roth in his first letter to Bartók: ". . . 'Progressive Pieces for Piano' or, what sounds very good in English 'Progressive Piano Pieces in Modern Idiom' or something of this kind." Roth further stated, "As far as the preface is concerned, we added

[37]Letter dated 14 July 1939.

[38]Letter dated 19 July 1939.

[39]Letter dated 21 July 1939.

[40]The manuscript was separated into two parts by the composer and mailed the 11th (Nos. 1-121) and 14th (Nos. 122-153, the Exercises, and the Preface and Remarks) of November, according to his letter dated 13 November 1939.

[41]Letter dated 18 December 1939.

[42]*Loc. cit.* The words do not appear in the first edition of the publication.

[43]Letter dated 20 December 1939.

a paragraph emphasizing the particular aim of your work," and he suggested that Bartók might "alter or rewrite it on similar lines."[44]

Bartók accepted the subtitle "Progressive Pieces for Piano" but voiced his disapproval in no uncertain terms concerning the use of the word "modernity" in the paragraph that had been written by the company and inserted in his original preface to the *Mikrokosmos*.

> 2. In the English and French Preface, I have some slight remarks. But as for those parts about the "modernity" inserted by you, that is quite impossible to publish it in a Preface, signed by my name, where I am speaking, and giving hints and winks in my own name. I would never do that: to make excuses for the "modernity" etc.; besides I don't like the word "modern" at all! Think of it: in 20, or let us say in 40 years this work will cease to be "modern." And what does it mean "modern"? This word has no definite sens [*sic*], can be misinterpreted, misunderstood![45]

On January 17, 1940, Bartók wrote to Roth that the subtitle should be "Progressive Piano Pieces."

Bartók's plan to leave Budapest for the United States in March prompted Hawkes's urgent request to his London office to complete the engraving of the *Mikrokosmos* so that Bartók might correct the first proofs prior to his journey. Then, Hawkes suggested, if second proofs were not required by the composer, the final proofs could be sent to New York for printing and copies of the work placed on sale during Bartók's visit.[46]

In an effort to comply with Hawkes's wishes, Roth mailed proofs to Bartók as soon as they were completed—two volumes at a time—and requested that the composer "refrain from having second proofs sent to Budapest."[47]

Unaware of Roth's request (the mail service between London and Budapest was considerably delayed at this time), Bartók wrote to Leslie Boosey demanding second proofs of the fifth and sixth volumes of the *Mikrokosmos* since the first proofs had been sent without Hungarian titles and words. He enclosed explanatory remarks to certain pieces, in German, which were to be translated into English and French "but no Hungarian publication of them is necessary, every musician or even amateur of serious music has a thorough knowledge of these subjects."[48]

Roth answered the above with another request that the composer should not ask for second proofs. Bartók yielded, "although reluctantly," and he insisted that the Hungarian titles and words missing from the first proofs would have to be shown to "Hungarian-knowing people, the best would be the composer Mátyás *Seiber*."[49]

Bartók also wanted the explanatory notes to be on the same pages as their respective pieces (after each piece, or at the end of the page) in the first and fourth volumes of the *Mikrokosmos*.[50] In a postscript, however, he states that the notes could be printed as "Remarks" providing that an asterisk would be inserted after the number of the respective piece. In another section of the same letter, he comments

[44] Letter dated 2 January 1940.

[45] Letter dated 7 January 1940.

[46] Letter dated 15 January 1940.

[47] Letter dated 19 January 1940.

[48] Letter dated 21 January 1940.

[49] Letter dated 2 February 1940.

[50] *Loc. cit.* He was correcting the proofs to these volumes at the time. In the published copies of the *Mikrokosmos*, the explanatory notes appear on the last page of Vols. I, II, and IV, and after the respective pieces in Vols. III, V, and VI.

that the ten days it took him to correct the fifth and sixth volumes were not too much "for such complicated proofs," and he adds,

I hope, you are not too much shocked by the additions I put into the proofs and by the few alterations (in some cases it appeared that in the Mss there are faults). In any case, take anything I have written into the proofs as my "last will," and disregard whatever contradictory you see in the Mss.[51]

Bartók's original plan to publish the first 66 pieces in one volume was discarded by the company, who thought it would be more practical in terms of a lower selling price per volume if the pieces were assembled into two books. The composer could not understand why the division had to be made since the proofs of the sixth volume contained almost as many pages (55) as those comprising Vols. I and II (66, including the exercises and explanatory notes).

It is a pity, that this division has been made: now, the first book gives a very poor impression; besides, the contents of those 60 pages are a real unity; they are meant for the first year of piano-studying. Now, every student will have to buy—after a few month's studying, the second book! Could not be changed this disposition?[52]

Roth replied that the first three volumes were to be priced lower than the last three, and he asked Bartók to accept the division.[53]

In the meantime, additional proofs were sent to Bartók as soon as they were engraved. The haphazard order in which they were mailed and the demands made upon him to speed the proofreading were not to his liking, as evidenced by the following statements made in his letter to Roth dated February 18, 1940:

This is awful, this hurrying with the proofs; I am afraid there will be still many inconsequences: I have no opportunity/occasion to have here everything (6 books, exercises, notes, preface) at the same time and make the comparison.

This is a very complicated business, much more complicated than an ordinary score . . . I wonder why it is so important, to bring out these volumes until April. But if we do that, then the number of copies should be rather limited, in order to be able to correct every inconsequency and fault (resulting from this hurried work) in a very soon second edition.

I don't see any other possible way.[54]

On April 5, 1940, Roth reported to Hawkes that "we shall have finished copies by the 10th or 12th of April." Within the next two weeks the work was placed on sale.[55]

III

The *Mikrokosmos* manuscripts on file at the Bartók Archives have been assembled into three classifications: Sketches, Intermediary Drafts, and Final Copies. Comparison of the manuscripts and examination of the correspondence between Bartók, Ralph Hawkes, and Ernest Roth discloses what seems to have been the composer's procedure in the revision and correction of the *Mikrokosmos*.

The Sketches, consisting of 80 pages, are written in blue ink on manuscript paper of various sizes and stave types. Deletions and insertions ranging from single notes to whole sections appear in profusion throughout the manuscript, and the scrawly autography

[51] *Loc. cit.*

[52] Letter dated 5 February 1940 and addressed to Roth.

[53] Letter dated 15 February 1940.

[54] The writer discovered *errata* in more than 25 pieces.

[55] Letter from Roth to Hawkes, 23 April 1940.

seems to indicate a certain amount of feverish activity on the part of the composer to notate his musical ideas as rapidly as possible. Five pieces, all crossed out, and two exercises are contained in this manuscript which do not appear in the published volumes of the *Mikrokosmos*. Also, the sketch of *Unison* (no. 137) appears in the MS. of *Nine Little Piano Pieces*.

There are 82 pages of Intermediary Drafts which are written in black ink on tissue masters composed of eighteen or twenty staves. There is in this manuscript, too, a considerable number of deletions and insertions but not to the extent that they appear in the Sketches. On the other hand, the notation here is neat and precise. Titles are in Hungarian and German for the most part (some are in English), and almost all of the pieces contain timings, expression marks, and metronomic indications. Twenty-two of the pieces are marked with the final numbers assigned to them in the published copies. However, the numbers were probably added after the Final Copies had been drafted since the numerical designation of *Thumb Under* (no. 98) appears on a tissue master but not on its photographic reproduction.

Although the pieces in this manuscript seem to represent second drafts of the Sketches, several can be found in more than one version.[56] For example, a preliminary draft of no. 46 is written so that the melody begins with the right rather than the left hand; nos. 51 and 88 appear also in transpositions down a minor third and up a perfect fifth respectively; and nos. 111 and 142 exist as well in incomplete form. Two variants of no. 145a can be found (the piece consists of "a" and "b" parts which can be played separately as individual compositions, or together as a piano duet) that do not appear in the published *Mikrokosmos*. The first is in retrograde motion transposed down a major third, and the second variant is a melodic inversion. No. 147 appears also in a simplified form without octaves and hand crossings. Finally, one of the cancelled pieces of the Sketches is in the Intermediary Drafts, but it, too, is crossed out.

According to his letter to Ralph Hawkes dated November 13, 1939, Bartók mailed a complete set of final copies of the *Mikrokosmos* to Boosey and Hawkes in London. This manuscript has not been available for inspection by the writer, but it is not unreasonable to assume that it does not differ appreciably from the Final Copy (#1) on file at the Bartók Archive in terms of revision or correction since the latter manuscript is identical for the most part to the publication.[57]

It is likely that Bartók had at least two complete sets of photographic reproductions made from the tissue masters, correcting one set which he retained in his personal files (now in the Bartók Archive) and then completing the other for use by the engraver.[58]

Final Copy #1 consists of 49 pages of tissue proofs and 21 pieces written in blue ink on as many sheets of four-stave manuscript paper approximately

[56]Thus, the manuscript consists of first and second Intermediary Drafts, and it has been filed under the code number 59PID1ID2 in the Bartók Archive since the variants and preliminary drafts cannot be separated without damage to the other pieces.

[57]Exceptions are certain English and all French titles.

[58]Tissue proofs of some pieces were given by Bartók to his pupils, Dorothy Parrish Domonkos and Wilhelmine Creel Driver.

6" × 9" in size.[59] The principal differences between this manuscript and the Intermediary Drafts are revised fingerings, additional English titles, and the insertion of numerals indicating the order of the pieces and exercises.[60]

Bartók proofread the third and sixth published volumes of the *Mikrokosmos* which are on file at the Bartók Archive under the designation Final Copy #2.[61] His corrections, made in red crayon, extend to the addition of a dollar sign before the numerals "1.25" on the title page of Vol. III.[62] The *Mikrokosmos* was issued by Boosey and Hawkes in April, 1940, in English and American editions printed from the same plates.[63]

IV

Bartók transcribed seven pieces from the *Mikrokosmos* (nos. 113, 69, 135, 123, 127, 145, and 146) for two pianos (four hands) which was published by Boosey and Hawkes in 1947 under the title, *Seven Pieces from "Mikrokosmos."* Notations made on the cover page of the manuscript used as the engraver's final copy indicate that Bartók probably submitted the transcriptions for publication in 1944.[64]

Tibor Serly transcribed nos. 139, 102, 108, and 142 for string quartet,[65] nos. 128, 140, 117, 146, 151, and 153 for piano and string orchestra,[66] and nos. 139, 137, 117, 142, 102, 151, and 153 for full orchestra.[67] The transcriptions for piano and string orchestra were performed first in March, 1942, by Mrs. Bartók and some friends on the occasion of Bartók's 61st birthday.

I set the *Mikrokosmos* for strings as a birthday present for Bartók at a party in my apartment. It was after hearing them that he paid me one of his rare compliments: "If I were a king I would make you my court composer." Perhaps that is what Bartók might have had in mind—to later expand the *Mikrokosmos* for orchestra.[68]

V

Mention is made above of Bartók's first performance of pieces from the *Mikrokosmos*. He played twenty-seven pieces, which were divided into two groups as follows: nos. 70, 81, 90, 78, 100, 62, 87, 84, 110, 91, 92, 73, 129, 131, 116, 124, and 122 in the order listed (nine minutes and thirty-nine seconds of playing time) and, after the intermission, nos. 133, 126, 140, 142, 143, 147, 144, 145, 137, and 146 (ten and a half minutes of playing time).[69]

The composer played excerpts from the work on May 7, 1937, according to a letter he wrote to Mrs. Müller-

[59]Nos. 1-10, 13-16 ,26-29, 38, and 39.

[60]It will be noted that 33 pages of tissue proofs are missing from this manuscript. At the present time, their whereabouts are unknown.

[61]The writer has been unable to determine whether Bartók corrected the other published volumes.

[62]In the preparation of the final copy of *Seven Pieces from "Mikrokosmos"* (for piano duet), Bartók found errors in No. 145b which he had overlooked when proofreading Final Copy #2 (he cut and pasted together the published versions of 145a and 145b as piece No. 6).

[63]According to information contained in correspondence between Ernst Roth and Ralph Hawkes in February, March and April, 1940.

[64]The notes are not in Bartók's handwriting. Description of the manuscripts and determination of their dates of commencement and conclusion have not been made here since the collection of the various documents concerning the transcriptions has not been completed by the Bartók Archive at the present time.

[65]In 1941. Published by Boosey and Hawkes under the title, *Five Pieces from Mikrokosmos*, and recorded on BRS 901.

[66]In 1942. Unpublished.

[67]In 1943. Published by Boosey and Hawkes under the title, *Mikrokosmos Suite*, and recorded on BRS 303.

[68]Tibor Serly, in an interview with the writer, 21 December 1954. Unknown to Serly, Bartók had planned to score some of the *Mikrokosmos* pieces, such as the *Six Bulgarian Dances* (Nos. 148-153).

[69]Program File, Bartók Archive. The pieces are listed by title on the program, and the timings were noted by Bartók in pencil on the program.

Widmann,[70] and on January 20, 1938, played three groups of pieces for a B.B.C. broadcast, in London. In the order listed, the pieces performed were nos. 125, 88, 130, 138, 120, 109, and 139 (eight minutes and thirty seconds); 53, 106, 94, 108, 132, 103, 114, and 123 (eight minutes and fifteen seconds); and 148-153 (eight minutes and forty-eight seconds).[71]

On February 17, 1938, Bartók played five pieces from the *Mikrokosmos* (nos. 140, 142, 144, 137, and 146) at a concert in Zurich, and a similar recital was played in Brussels and Antwerp.[72] Nos. 94, 108, 132, 103, 114, 125, 130, 120, 109, 139, and 148-153 were played at the Boosey and Hawkes Organ Studio in June of the same year.[73]

The first American performance of pieces from the *Mikrokosmos* was given by Bartók on April 16, 1940, at Juniata College, Huntington, Pennsylvania. Played in two groups, the first comprised nos. 116, 129, 131, 68, 126, 102, 113, and 115; and the second, nos. 140, 142, 144, 137, 133, 138, 109, and 148-153.[74] Three days later Bartók played from the work at the Musical Arts Club in Chicago and a week later at the Curtis Institute of Music in Philadelphia.[75]

Bartók sailed for Hungary on May 18, 1940, to settle his affairs before establishing residence in the United States. His farewell concert in Budapest on October 8, 1940, included five pieces from the *Mikrokosmos* nos. 141, 128, 126, 102, and 148-153.[76]

After his return to New York on October 30, 1940, he prepared for the concert season of 1940-1941 several programs which included excerpts from the *Mikrokosmos*. Certain of his programs combined a lecture on "Contemporary Music and Piano Teaching" with a recital in which he played eighteen pieces from the work: nos. 40-42, 52-53, 62, 68-69, 73, 78, 82, 84, 87, 94, and 90-92.[77] Some programs contained nos. 122, 128, 126, 102, and 148-153[78] or nos. 140, 142, 144, 137, and 136,[79] and other recitals combined those groups.[80] Bartók also played duo-piano recitals with his wife, and these included transcriptions from the *Mikrokosmos*.[81]

In 1938 Bartók recorded nos. 124 and 126 for English Columbia and in 1941 nos. 94, 97, 100, 108-109, 113-114, 116, 118, 120, 125-26, 128-131, 133, 136, 138-144, and 147-153 for Columbia (American) Records.[82] Transcriptions of nos. 69, 127, and 145 for two pianos were recorded by

[70] Béla Bartók, *levelei*, ed. János Demény (Budapest: Müvelt Nép Könyvkiadó, 1951), p. 123.

[71] Program File, Bartók Archive.

[72] *Loc. cit.* (From a pencilled notation in Bartók's handwriting. The dates are not listed.)

[73] See footnote 24.

[74] Program File, Bartók Archive.

[75] *Loc. cit.* (From a notation made by Bartók on scratch paper. The titles of the pieces are not listed.)

[76] *Loc. cit.*

[77] Given at Oberlin Conservatory, Mills College, University of Washington, and the University of Kansas City. The Mills College program also included Nos. 140, 142, 144, 137, and 146.

[78] At the New Jersey College for Women, Swarthmore College, and Vassar College.

[79] At the Detroit Institute of Arts, Stanford University, Wells College, and the University of Oregon. Nos. 148-153 were also played at Stanford, Wells, and Oregon.

[80] At Oberlin Conservatory, Princeton and Brigham Young Universities, University of Washington, Reed College, and the Wilshire Theater in Los Angeles.

[81] Nos. 69, 135, 127, and 145 were given their first American performance at Town Hall (New York City) on 24 November 1940. Nos. 123 and 146 were played at Amherst College on 23 February 1942.

[82] Titles and numbers appear on the American Columbia (ML 4419) recording. The jacket lists thirty-five titles, but Nos. 122, 72, and 146 are not performed on the record.

the Bartóks for Continental Records in 1943.[83]

SUMMARY

The *Mikrokosmos* was composed from 1926 to 1939, probably in Budapest for the most part, with *Unison* (no. 137) perhaps the first conceived of the 153 pieces that comprise the work published in 1940 by Boosey and Hawkes.

The *Mikrokosmos* manuscripts consist of sketches, intermediary drafts made on tissue masters, and final copies which comprise corrected tissue proofs and published copies. Errors in the publication noted by the writer have been listed for the publisher who is now preparing corrected reprints of the work.

The first performance of pieces from the *Mikrokosmos* in a concert hall took place on February 9, 1937, and was played by Bartók at Cowdray Hall in London. Juniata College, Huntington, Pennsylvania, was the location of the first American recital of pieces from the work played by Bartók on April 16, 1940.

Bartók's first lecture-recital in America on piano pedagogy was given at the Oberlin Conservatory of Music on December 3, 1940, in which eighteen pieces from the *Mikrokosmos* were used to illustrate his talk on "Contemporary Music and Piano Teaching."

The composer transcribed seven pieces from the *Mikrokosmos* for two pianos (four hands) which were published by Boosey and Hawkes posthumously. Bartók and his wife played the first American performance of four of the transcriptions at Town Hall in New York City on November 24, 1940.

The programs listed above indicate Bartók's preference in terms of programming pieces from the *Mikrokosmos* for concert use.

He recorded thirty-two pieces from the work on Columbia ML 4419 and three of the duo-piano transcriptions with his wife on Remington R19994. These recordings are of particular value to the teacher and student of the *Mikrokosmos*.

The evidence indicates that the *Mikrokosomos* was not conceived of as a piano method in 1926, the year of its origin, but as recital pieces to fill the need Bartók had of such material due to the increase in his concert bookings.

The conception of the *Mikrokosmos* as a collection of piano pieces with a didactic purpose, and possibly even of the title itself, may have occurred to Bartók between 1933 (the year Mátyás Seiber's "Rhythmic Studies" was published) and 1936 (the year the composer began teaching his son, Peter, the piano). Then, in 1939, Bartók completed the work by adding a certain number of pieces to the first two volumes.

Woodmere, New York.

[83]Continental 4008 or Remington R19994.

Musical Intervals and Simple Number Ratios

NORMAN CAZDEN

THE CONNECTION between common musical intervals and simple numbers has been an intriguing mystery since ancient times. There has indeed been little difficulty over the facts showing this connection, which are not mysterious, and which are hardly subject to dispute at this time. But there remains considerable uncertainty as to the meaning of these facts, whether for the theory and practice of the art of music or more urgently for certain fundamental problems in aesthetics and in general philosophy.

The interpretation of this connection entails numerous ramifications and a whole series of paradoxes. Thus, what would appear at first sight to involve merely some technical details about the elementary relations of musical tones has acquired a very large significance for the whole range of art, science and human thought. These ramifications, rather than the immediate technical concern with musical harmony, have been responsible for the very great interest which musicians and others have shown in the problem.

True, practitioners of the art of music of late have not notably been drawn to questions of deep theoretical import. The trend of music "theory" texts has been increasingly in the direction of rule-of-thumb manuals, more or less ingenious schemes for the painless teaching of standard routines, and new systems of classification or procedure said to reveal the craft secrets of the art or the unconscious processes of composers no longer here to defend themselves. Current musicological research seems bent upon the obtaining of adequate documentation of no matter what, and is thus correspondingly chary of possibly speculative generalizations or inter-connections. Thereby we obtain new presentations and embroideries of past theoretical thought, and but little illumination or new thought.

Yet every lively student of music is apt at some time to have been confronted with the stated connection between music and mathematics. Most have been excited to wonder about it, but have given up the quest under cover of one or another hasty but saving dismissal. Many have filed the matter away in their minds either as something to be pursued when and if the opportunity arises, or as a subject far too technical for attention and solution by mere musicians, little aware that it was not always so considered. Similarly, students of physics, who have likewise been informed regularly about the bearing of acoustics on certain musical relations, most often accept the facts as though they were adequately explained and unquestionably applied, thereafter continuing to argue neither the scientific nor the human approaches to music which ought properly to concern them, but rather the frequency response curves of amplifiers and the relative merits of Brahms quartets and *musique concrète*. It has usually been the more philosophical among scientists, and

sometimes unfortunately the more questionable among these, who have raised the curious question of what music has to do with numbers.

The paradoxes of the question are many. A musical interval is but an elementary particle of the sounding art which is music, yet its declared dependence on number leads to decisive opinions on the very large matter of pure form in "absolute" music. With the connection between interval and number undoubtedly a permanent datum of nature, some difficulty is engendered for the justification of innovations introduced into contemporary harmony. The facts of the connection are laudably exact, and have been proven by all proper scientific demonstration, yet its implications have always related more to number-magic and mysticism than to science. Number ratios seem to provide a natural source for the art of music, yet we know that this art is a creative activity of human beings, and that in other things human beings have necessarily challenged and overcome their natural conditions of existence and that they have not hesitated to bend natural forces to their own needs and wishes.

It is indeed this question of the ultimate dependence of the art of music upon certain natural phenomena said to underlie it, with all the import of this question for the aesthetics of music as well as for the understanding of musical harmonic techniques, old and new, which is raised in the present inquiry. We cannot, however, deal with so general a question unless a proper exposition of the facts has been made and analysed, and to do even this would require an impractical length. Therefore we limit ourselves here to a statement of the relevant physical data alone.

It is useful to remind ourselves that these physical data, provided by that branch of physics called *acoustics,* relate to all those aspects of musical sound that may be studied by means of physical instruments, techniques and observation, but which *do not* involve what we hear. How we hear sound falls properly in the domain of physiological acoustics, concerned with the structure and function of the ear, and how we perceive and respond to sound belongs to the psychology of perception, more strictly psycho-acoustics. In each of these three fields, however, the same problem presents itself in a form which may be generalized as the *natural law theory of consonance,* arising from the observed connection between common musical intervals and simple number ratios.

In general, the natural law theory, in its various formulations, seeks to establish the foundation of musical structure in objective phenomena; that is, in the operation of the physical laws of sound, in the effective reception and transmission of sound by the ear, and therefore in the necessary and inescapable forms of the perception of relations among sounds. This theory consequently makes possible a direct connection between the elementary procedures of music and the properties of the sounding medium through which it operates, a connection so remarkable as to occur in no other art, and indeed in no other field of human activity.

The expression of this natural law consists in the determination of musical consonance by relations which may be briefly stated in the form of simple number ratios. "Tonal relations are founded in Nature, in the characteristics of sounding materials and of the ear, as well as in the pure relations of abstract numerical groups. We can-

not escape the relationship of tones."[1]

The response of consonance relates to a distinct feeling of relationship, in particular, between and among musical tones sounded together; in brief, those combinations of tone that enter into musical harmony. Due to the "law of nature," it is held according to this theory that the response of consonance is not subject to the vagaries of human thought, much less to the transitory historical processes of human culture. Consonance is indeed considered to be quite independent of these things because it arises from inalterable nature. It is thus predetermined, pre-ordained, absolute, eternal and universal. The objective laws of which musical consonance is the mundane form cannot change or be changed in conformity with mere human desires; on the contrary, these laws control all expressions of those desires. "The primary rationale of all music is the periodic and complex motion of the vibrations; this motion is indispensable to the perception of sound; it has its reason for being, its special life, its laws, its attributes, its consequences, and all the conditions which reasoned experience surely reveals to us."[2]

Music, indeed, may have a history, but in this view there can be no history for the natural law of consonance on which all music is necessarily founded. Behind all historical, transitory forms of musical art, and underlying all regional varieties of musical idiom, lies the single and inalterable principle of consonance. It follows, for example, that the scale system of music "is universally the same at all times and in all countries; for as this is the scale of nature, there is sufficient reason to believe that the principles of harmony, the number and quality of consonances and dissonances, are fixed and determined by certain laws, which therefore must remain unalterable, whether they are understood in part, or in the whole."[3] "The origin of harmony must be sought in natural phenomena,"[4] states a didactic work of the last century, just as we find it so frequently today. "The consonances which are actually used in music, which form the material of harmony and constitute the ultimate basis of all rational musical systems, do not depend for their origin on caprice. On the contrary, they are determined by certain numerical proportions which are as definite, precise and invariable as any natural or scientific laws whatever."[5]

One might expect composers and theorists of modern tendencies, those who are frequently desirous of forming new concepts of consonance or of dissonance in conformity with new practices, to have disavowed an implicit faith in the natural law doctrine. On the whole, this has not happened. Sessions, for example, proposes as the initial step in a study of harmony a contact with facts—"facts of a demonstrable and fundamentally inexorable nature. First of all the elemental sonorous and rhythmic facts on which

[1]Paul Hindemith, *The Craft of Musical Composition*, translated by Arthur Mendel (2 vols., New York, 1942), vol. 1, p. 152.

[2]Xavier Perreau, *La Pluralité des Modes et la Théorie Générale de la Musique* (Paris, 1908), p. 30: "La raison première de toute musique est le mouvement périodique et complexe des vibrations; ce mouvement est indispensable à la perception du son; il a sa raison d'être, sa vie spéciale, ses lois, ses attributes, ses conséquences, et toutes conditions que l'expérience raisonée nous révèle surement."

[3]John Keeble, *The Theory of Harmonics* (London, 1784), p. 8.

[4]Frederick Arthur Gore Ouseley, *A Treatise on Harmony* (Oxford, 1868), p. 14.

[5]Matthew Shirlaw, *The Theory of Harmony* (London, 1917), p. 68.

music is based and to which it is subject. Such a fact is the overtone series of which the properties are inevitably at the basis of our whole perception of musical tone and from which the human ear has deduced a whole hierarchy of relationships between wholes—relationships which are in nature itself and hence quite independent of human will or convention."[6] A follower of Schönberg maintains that "the fundamental materials of music are the tone-equivalents of the series of proportionate relationships perceived within the wave-ratios of a single vibrating string."[7]

The natural phenomena of sound which result in the appearance of simple and therefore "consonant" ratios arise from several distinct aspects of the physical laws of sound. Let us examine these aspects in the historical order of their discovery. The physical data comprise, first, the proportional lengths of sounding strings and tubes; second, the ratios between the vibration frequencies of musical tones; third, the harmonic series of overtones produced by the complex vibrations of a sounding body; and fourth, the "chord of nature" deemed to derive from that series. We may then take note of some of the exceptions expressed as to the interpretations given these acoustic data.

Consonance and Proportional Length

The equation between musical consonance and s i m p l e proportional lengths of strings and sounding tubes has been known since ancient times. Though it was probably known earlier, at least in China, the connection was probably first systematized by Pythagoras and his followers, about 550 B.C. It was intimately associated from the first with the famous doctrine of the "harmony of the spheres," of which more on another occasion.

The Pythagorean doctrine starts with the following empirical observations: If we sound two strings whose lengths are in the proportion 1:2, they produce together the musical interval called the octave [Fig. 1, (a) and (d)]. Strings whose lengths are in the proportion 2:3 produce the musical interval of the fifth [Fig. 1, (b) and (d)], and the proportion 3:4 similarly corresponds to the fourth [Fig. 1, (c) and (d)]. Of course, the proportion 1:1, which s h o u l d be added for completion, represents two strings of equal length sounding the same pitch, or unison.

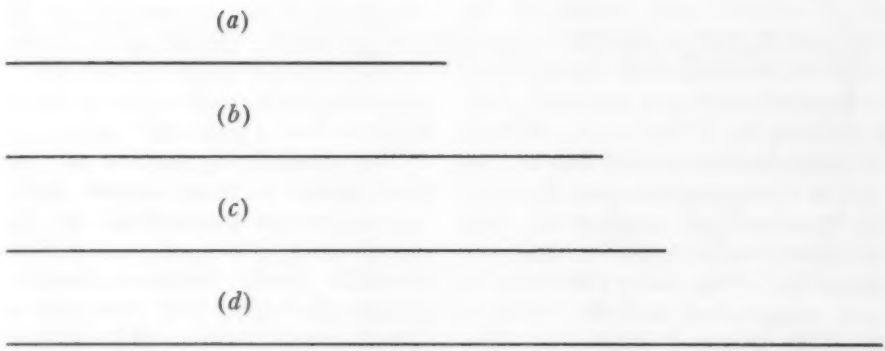
For these observations to hold true in practice, it is necessary that the strings be of equal weight, elasticity and tension, and that certain wide limits of register and of intensity be observed. These conditions are met on the medieval *monochord*, a device by means of which a single string can be divided readily into simple proportional lengths and the resulting pitches compared.

Now these proportions involving the simplest integer values 1:1, 1:2, 2:3 and 3:4 correspond therefore to the musical intervals which in ancient Greek music, and indeed in our own, are the essential standards for the tuning of musical instruments: the unison (*symphonia*), octave (*antiphonia*), fifth and fourth (both termed *paraphonia*). They provide the fixed points whose exact agreement ("consonance") can be identified by the unaided ear, and they may therefore act as the standard of measurement

[6]Roger Sessions, "New vistas in musical education," *Modern Music*, XI (1934), 118.

[7]George Perle, "The evolution of the tone-row," *Music Review*, II (1941), 287.

Fig. 1



from which the more variable melodic divisions of the modes may be determined.

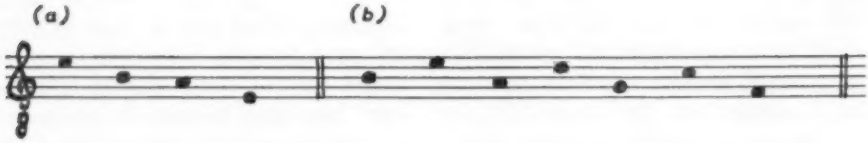
In practice, the unison and octave are no more than duplications of the initial pitch, and hence are of limited usefulness for purposes of tuning. The scheme of tuning instruments on the Pythagorean principle therefore utilizes a series of the next most simple relations, fifths; more strictly, of an alternation of fifths and fourths, which bring the resulting tones within the range of an octave. The fixed tones of the ancient Greek "perfect system" of two disjunct tetrachords, for example, may be established by the placement of strings in the proportionate lengths 6:8:9:12 [Fig. 2 (a)]. A series of alternating fifths and fourths, giving the tones of the Dorian mode of the diatonic genus, may be obtained by using string lengths alternately in the proportions 3/4 and 3/2 [Fig. 2 (b)].

Now the readily perceived agreement of the tones arrived at by the application of these proportional relations is what the ancient Greeks called "consonance." The Pythagorean view, which is thus the early form of the natural law theory, goes considerably beyond the observed connection: it *attributes* the quality called consonance to the presence of simple number ratios.

It is important to note that consonant agreement in the sense thus far employed implies no more than a principle of tuning. It provides a useful standard of measurement by means of which musical tones can be fixed accurately in the desired pitch relations. It entails the observation that for those intervals which can be expressed in the simplest number ratios, the musician can judge by ear, with a high degree of subtlety, whether or not they are correctly in tune. And conversely, if these intervals are so in tune, they can be expressed in terms of simple proportional lengths.

The confusion arising from this demonstrable connection between certain musical intervals and simple number ratios consists in interpreting "consonance" in the above sense to mean something more than a standard of measurement or tuning. Instead of being regarded as a method by which certain desired pitch relations may be obtained in practice, the Pythagorean principle is taken to be the *cause* of the desired relations, and thence of

Fig. 2



their musical role as well. Further, the *fact* of the connection between musical intervals and numbers is often mistakenly made dependent upon *our knowledge* of the fact. These confusions, compounded over the centuries, lie at the source of most of the difficulties that have attended the investigation of the nature of musical consonance.

Unquestionably a musical practice existed long prior to the discovery of the Pythagorean principle, and there is no indication that the discovery led to any change in the art of music. But it was believed by the Pythagoreans that the ordering of musical tones in the practice of the art is unconsciously controlled by the determinative power of numbers, even if that control is not recognized. Simple number ratios are thus, by extension, made the pervasive and underlying principle, not only of music, but of the universe. Certain musical harmonies, represented by the "consonant" ratios of simple numbers, are taken to represent also a Universal Harmony in a philosophic sense. Those proportions found in the relations of musical consonances are to be observed also in the relative distances of the planets from the sun, according to ancient cosmology, and are reflected also in that balance of bodily Humors corresponding to health and sanity. Thus Number comes to represent the "harmony of the spheres," of which mundane music is taken to be the earthly image.

The musical application of the Pythagorean doctrine embraces therefore a correct prescription for the measurement of intervals, and this has a valid if limited usefulness. But the philosophic implications drawn from the observed facts were of far greater concern to early writers on philosophy and also on theology, while writers on music were typically more concerned with this question than with any relating to the mere practice of the art of music.

And so the musical intervals termed "consonant" in ancient Greek musical terminology, those which could be represented by simple number ratios, acquired a special theoretical status. In consequence, reasoning about the mysteries of number dominated the thought of musical theorists in medieval times. "They are the numbers which create consonances, even as through them the same are to be distinguished" [8] writes Isidorus [d. A.D. 636]; and, having established the properties of the ratio 4:3 by means of numerical speculations, he declares: "From this arises the interval that in music is called the fourth."[9] Johannis de Muris [c. 1313] attests: "Besides, the number four is the principal consonant number, containing in itself the

[8]Isidorus, "Hispalensis Sententiae de Musica," in Martin Gerbert (editor), *Scriptores Ecclesiastici de Musica Sacra Potissimum* (3 vols., 1784), vol. 1, pp. 19-25: "Sunt numeri, qui consonantias creant, vel per quos ipsae discernuntur."

[9]ibid.: "De his nascitur symphonia, quae in musica adpellatur diatessaron."

proportions."[10] Writes Vicentino, "Natural number demonstrates the creation of the consonances and of the dissonances."[11]

Mersenne compares the musical consonances to the geometrical properties of a cube: "The solid or cube contains all the consonances; since it has to begin with 6 square surfaces, 8 solid angles, 12 edges and 24 plane angles; now 6:8:12:24 give us the principal consonances, for 8:6 [4:3] makes the fourth, 12:8 [3:2] the fifth, 12:6 or 24:12 [2:1] makes the octave, 24:8 [3:1] the twelfth, and 24:6 [4:1] the fifteenth, or double octave."[12]

At this point, however, the arguments become distinctly curious, because in musical practice the interval of the fourth had fallen into disrepute, while the thirds and sixths came to be recognized as consonances, albeit "imperfect" ones. The difficulty of the fourth was excused on various grounds;[13] while the simple numbers considered efficient in producing the response of consonance were extended to six integers instead of four, since thirds and sixths cannot be represented in numerical proportions without the numbers 5 and 6. Descartes reduces the consonant numbers further by eliminating those divisible by 2, as these represent no more than octave duplications. In consequence he holds that "there are only three harmonious numbers, 2, 3 and 5, the numbers 4 and 6 being composed of them."[14] Holder[15] includes the entire series: "All Concords are in Rations within the Number Six; and I may add, that all Rations within the Number Six are Concords."

And so, in one or another variation, we find the Pythagorean doctrine endlessly repeated, down to the present day. Norden[16] states as a self-evident fact that "the most consonant chords are those with the lowest ratio numbers." While additional information about acoustical phenomena now enters into the acceptance of the position, it is the properties of the numbers themselves which are still regarded as directly efficient in producing the response of consonance. Chaignet, in a survey of the Pythagorean school, finds no reason to challenge the literal validity of the doctrine: "The simplicity of numerical relations, such as has been discovered through the study of the properties of numbers, that is what ought to constitute true harmony."[17]

[10]Johannis de Muris, "Speculum Musicae, Sextus Liber et Septimus," in Edmond de Coussemaker (editor), *Scriptorum de Musica Medii Aevi Nova Series* (4 vols., Paris, 1864-1876), vol. 2, p. 224: "Quaternius etiam numerus principalium consonantiarum in se continet proportiones."

[11]Nicola Vicentino, *L'Antica Musica Ridotta alla Moderna Prattica* (Roma, 1555), p. 29: "Il numero naturale dimostra la creatione delle consonanze & delle dissonanze."

[12]Marin Mersenne, *Traité de l'Harmonie Vniverselle* (Paris, 1634), p. 385: "Le solide ou le cube contient toutes les consonances; car il a premierement 6 bases quarrées, 8 angles solides, 12 costez, & 24 angles planes; or 6.8.12.24 nous donnent les principales consonances, car 8 & 6 font la Quarte, 12 & 8 la Quinte, 12 & 6, ou 12 & 24 font l'Octaue, 24 & 8 la Douziéme, & 24 & 6 la Quinziéme, ou double Octaue."

[13]cf. Norman Cazden, *Musical Consonance and Dissonance* (Thesis, Harvard University, 1947), pp. 269 ff.

[14]René Descartes, "Abrégé de la Musique," in *Oeuvres* edited by Victor Cousins (Paris, 1824), vol. 5, p. 462: "Il n'y a que trois nombres accordants, 2, 3 et 5, les nombres 4 et 6 étant composés d'eux."

[15]William Holder, *A Treatise of the Natural Grounds and Principles of Harmony* (London, 1731), p. 51.

[16]N. Lindsay Norden, *The Mystery of the Dominant-seventh Chord* (Philadelphia, 1936), p. 4.

[17]Anselme Edouard Chaignet, *Pythagore et la Philosophie Pythagoricienne* (2 vols., Paris, 1873), vol. 2, p. 135: "La simplicité des rapports numériques, tels que l'a fait découvrir l'étude des propriétés des nombres, voilà ce qui devait constituer la vraie harmonie."

The principle of the origin of musical consonance in numbers, however, has also been under attack almost from its inception.

To Aristoxenus and his followers, consonance is a musical concept, a judgment of the ear. The easily perceived accuracy of agreement of certain musical intervals therefore has nothing to do with numbers. According to Aristoxenus, the Pythagoreans "introduced extraneous reasoning, and rejecting the senses as inaccurate, fabricated rational principles, asserting that the height and depth of pitch consist in certain numerical ratios," thereby producing "a theory utterly extraneous to the subject and quite at variance with the phenomena."[18] Musical practice, not mathematical speculation, is in this view considered the only dependable guide for the theory of music.

Thus an early Arabic theorist of wide repute castigates those of his predecessors who were more concerned with speculations about the Pythagorean tuning formulae than with the exposition of actual tone relations found in music: "Some [theorists] have followed the view of the Greek mathematicians, the others have taken no account of it; able practitioners, trained in music, they have placed their sole faith in their ear. Their great experience has dictated to them what they advance in their writings. . . . They are therefore closer to the truth than those theorists of our time who have wished to follow the view of the Greek mathematicians of antiquity. They have followed them, but they did not possess their knowledge, nor the experience and the aesthetic sense of the more recent practitioners."[19]

Even Zarlino, though he develops his own very important theory about the just major third in terms of the ancient method of simple ratios, scorns the "Filosofi" who regard mathematical constructions as of greater pertinence than musical practice. Zarlino contends that the "custom of compounding in this manner not only is not useful; but the more harmful for the loss of time, which is more precious than anything else; and that the points, the lines, the circles, the semicircles and other similar things, which are depicted in diagrams, are submitted to the sense of vision and not to that of hearing: and are matters considered in Geometry; but the tones and the melodic lines (as to those, which are truly the proper object of hearing, from which arise every good Consonance and every Harmony) are principally considered in music."[20]

A later Aristoxenian attributes all

[18]Aristoxenus, *The Harmonics*, translated with introduction and notes by Henry S. Macran (Oxford, 1902), pp. 188-189.

[19]Al-Fārābí, "Kitabu L-Musiqi Al-Kabir" ("Grand Traité de la Musique"), in Rodolphe d'Erlanger (translator and editor), *La Musique Arabe* (4 vols., Paris, 1930-1939), vol. 1, p. 52: "Certains ont suivi la voie des mathématiciens grecs, les autres n'en ont tenu aucun compte; habiles praticiens, rompus à la musique, ils se sont uniquement fiée à leur oreille. Leur grande expérience leur a dicté ce qu'ils avancent dans leurs écrits . . . ils sont donc plus près de la vérité que ceux des théoriciens de notre époque qui ont voulu suivre la voie des mathématiciens grecs de l'antiquité. Ils les ont suivis, mais ils ne possèdaient pas leur savoir ni l'expérience et le sens esthétique des praticiens plus recents."

[20]Gioseffo Zarlino, *Istitutioni Harmoniche* (Venetia, 1573), p. 343: "[il] modo di comporre in tal maniera non solamente non sia vtile; ma anco dannoso, per la perdita del tempo, che è più pretioso d'ogni altra cosa: & che li Punti, le Linee, i Circoli, i Semicircoli & altre cosi simile, che si dipongono in carto, sono sottoposto al sentimento del Vedere & no a quello dell'Vdito: et sono cose considerate dal Geometra; ma li Suoni & le Voci (come quelli, che veramente sono il proprio Oggetto dell'Vdito, dia quali nasce ogni buona Consonanza, & ogni Harmonia) sono principalmente dal Musico considerate."

of the many difficulties of music theory to unwarranted speculations about numbers: "The original Cause of the Mistakes, that have been made by some of the most learned among the Ancients in Musick was, that they took their first Principles from the *Mathematicks*, and by endeavoring to make *Musick* subservient to Numbers and Lines, and by calculating Proportions, have done themselves infinite Prejudice, but enduring Thousands of Years, in a Manner uncontrouled, and the latter Age fettered by Custom, those looked no farther, but took all they had found for all that could be found, and these *rarely* venture out of their Steps, but take from them everything upon Trust, and sacrifice their Judgment and Understanding to the Authority of the Ancients, and meanly give up the great Prerogative of thinking and judging for themselves."[21]

It is indeed possible to demonstrate that the definition of consonance in terms of simple number ratios, if intended to refer to the conditions of musical practice and not merely to tuning measurements, does not correspond at all to observed musical usage. "It is possible for an interval to be aesthetically dissonant while mathematically consonant, and vice versa."[22] The criticism of the Aristoxenians is so far correct. In truth, the Pythagoreans and their modern descendants have had to struggle with an ever-increasing discrepancy between their predications based on mathematical postulates and the actual practice of the art of music which these postulates are held to control. As a result, their theoretical formulations take on more and more the character of an abstract discipline with little pretense to musical relevance.

Neverthless, the contrary view that musical consonance has nothing to do with numbers also proves inadequate. The belief that the response of consonance is entirely due to an arbitrary choice or judgment of the "ear" cannot be sustained, since it turns out that those intervals whose special quality of agreement is noted by the "ear" are precisely those which can be expressed in terms of low integer values. The probability that such a coincidence be merely accidental is extremely slight. Moreover, it must be noted that the doctrine of simple numbers being reflected in certain prominent musical intervals is not in its origins based on mathematical speculations. The equation between the intervals deemed consonant and the simplest proportions among the relative lengths of sounding strings is an empirical fact, demonstrable by measurement.

It is therefore the material kernel of the problem, the physical action discovered in sounding bodies, and not the abstract simplicity of its numerical representation, which constitutes the positive value of the Pythagorean doctrine. Were we to consider numerical forms purely for themselves, it does not necessarily follow that the simplest ratios are those composed of small whole numbers. Number-magic and superstition have always dealt exclusively with these, but for mathematics low integers are not inherently simpler than many other terms. The ratios represented by π (the relation between the circumference of a circle and its diameter) or $\sqrt{2}$ (the relation of the diagonal of a square to one of

[21]John Frederick Lampe, *The Art of Musick* (London, 1740), pp. 2-3.

[22]Wilmer T. Bartholomew, *Acoustics of Music* (New York, 1942), p. 188.

its sides), for instance, are quite as immediate and elementary as the ratio 3:2 representing the relative lengths of lines. Krenek[23] declares on this point that "to place the multiplication table above logarithms in an aesthetic valuation would be, of course, utter nonsense."

Moreover, if abstract mathematical formulae be applied to so primary a musical structure as the scale, we find that the low integer values give rise to anything but simplicity. In the Pythagorean intonation, the scale is arrived at by means of a series of fifths, each represented by the ratio 3:2. If a tone thus obtained be compared with a near equivalent taken from a series of octaves of ratio 2:1, we find that the tones can never agree. The reason for this, stated mathematically, is that no rational integer power of a prime number is exactly divisible by a rational integer power of another prime number. Thus any resultant of a series of fifths, being a power of 3/2, can never be a whole number, and is in fact incommensurable with any resultant of a series of octaves, which is a power of 2. The discrepancy between the resultants of a series of twelve fifths and of seven octaves is equal to 531441/524288, known as the Pythagorean Comma. The formula for the equally tempered scale now in general use is provided by the twelfth root of 2. It is difficult to regard numerical forms such as these as intrinsically "simple."

With regard to the natural law theory as expressed in the Pythagorean doctrine of the correspondence of certain common musical intervals with simple number ratios, we may establish that: 1. Sounding strings whose lengths are in simple number ratios, all other things being equal, produce musical intervals whose agreement is readily perceived; 2. These intervals are the *unison* (ratio 1:1), the *octave* (ratio 1:2), the *fifth* (ratio 2:3) and the *fourth* (ratio 3:4), with some allowance also for octave extensions of these; 3. The intervals named are those defined as consonant intervals in the music theory of ancient Greece; 4. In this sense, consonance means an agreement between tones that can be identified accurately by the ear; 5. Consonance, so defined, is a concept of inestimable aid in the tuning of musical instruments; 6. The concept of consonance in musical usage seems to include more than the indicated agreement, and possibly to contradict it; 7. However, the connection between certain prominent musical intervals and low integer ratios must be more than a coincidence; and 8. Musical relations are not properly to be investigated or usefully associated with abstract numerical relations as such, but rather in connection with the specific physical phenomena of sound, of which the purely numerical expression is but a convenient representation.

Simple Ratios of Vibration Frequencies

Interest in the connection between musical intervals and simple numbers began with the phenomena of proportions. The monochord demonstrated how proportional lengths of a sounding string corresponded to determinate musical intervals. However, when Galileo, and later Mersenne, proved that musical tones are produced by periodic vibrations of sounding bodies, and that their pitch depends upon the frequency of these vibrations, the nat-

[23]Ernst Krenek, *Music Here and Now*, translated by Barthold Fles (New York, 1939), p. 194.

ural law theory of consonance appeared to receive new scientific verification.

Musical intervals could now be expressed as ratios of vibration frequencies, frequency being defined as the number of complete cycles of oscillation per second. The ratios obtained are, in fact, no other than the reciprocals of those expressing the relative lengths of strings. Thus the readily determined ("consonant") intervals in common use could once again be described in terms of simple numbers. Simple numbers, in turn, acquired a new acoustic validation. They were shown to be present in real sound.

The fifth, for example, is not only an interval produced by two strings whose lengths are proportional to 2:3 [the number 3 representing the lower tone]. The vibrations producing the tones a fifth apart are found to be of the speeds 300 and 200 cycles per second [the number 200 in this case representing the lower tone], or at speeds in that ratio. Hence the musical consonance of the fifth appears to be an inherent, real property of sound itself, a fact in nature. The Pythagorean doctrine, despite all the accretion of mysticism in which it was engendered and which it further suffered in the course of time, thus seems vindicated as properly scientific.

The definition of consonance, upon this, becomes a combination of the phenomena of simple ratios and those of vibration frequencies. This view quickly gained wide acceptance. "It is invariably found that the agreeable sounds are those, and those only, in which the vibrations of the individual notes are in some very simple numerical proportion to each other, as 1 to 2, 1 to 3, 1 to 4, 2 to 3, & c.; and that the concord is more satisfactory, and more pleasing, the lower the terms of the proportion are, and the less they differ from each other. While, on the other hand, such notes as vibrate in times bearing no simple numerical ratio to each other, or in which the times of the ratio are considerable, as 8:15, for example, when heard together produce a sense of discord, and are extremely unpleasant. This simple remark is the natural foundation of all harmony."[24]

The converse of the proposition, we observe, is equally stressed, though it remains to be investigated as to whether it properly follows in fact as well as in reason. For the Pythagorean doctrine, and for that matter the whole of ancient Greek musical theory, have nothing whatever to say of dissonance. "It is found that whenever the vibrations producing any two notes, have a simple or low proportion, they are in concord. The lower the proportion the more perfect the concord. Thus when the vibrations are as 1 to 2, 1 to 3, 2 to 3, and so on, musical concords are produced. When on the other hand the vibrations have no numerical proportion, discord is the result."[25] "Music is preoccupied much less with the absolute pitch-level of tones than with their relations or *intervals*. It is on these relations that the pleasure caused us by the union of certain sounds depends. When two tones are in the relation of these very simple whole numbers, they form an accord or a consonance; the dissonances are produced by the complex relations. It is in this sense that one

[24]Benjamin Peirce, *An Elementary Treatise on Sound* (Boston, 1836), p. 104.

[25]William Mullinger Higgins, *The Philosophy of Sound* (London, 1838), p. 71.

may say that music is all contained in numbers."[26]

It is noteworthy that the views above are expressed by physicists. For the most part, they are echoed by music theorists. To many scientists, nothing further need be said, save perhaps in the working out of details. Kryzhanovsky, for instance, undertakes the entrancing task of arranging nine musical octaves, each divided into 12 equal semitones, into columns and rows in accordance with the increase in the number of vibrations, to "correspond" with Mendeleev's zero column in the table of similar chemical elements. "This means," we are informed humorlessly, "that the whole of the tone material of our music enters into a periodic system, thereby emphasizing its naturalness based on the profound properties of the structure of matter."[27] Evidently musicians, for all the traditional vagueness of their aesthetic outlook, may still be outdone in poor reasoning and facile analogy by others claiming a more rigorous order of thinking and the support of undeniable fact besides.

Once again, however, we may note that while the familiar musical "consonances" may be expressible in terms of simple ratios of vibration frequencies, this is quite another thing from considering that simple ratios cause a consonance response in the full meaning given it in musical procedures. To state that an interval, such as the fourth, may be represented by the frequency ratio 4:3, merely reports an observation. It does not of itself justify the attachment of attributes implying such broad connotations as the quality of consonance. For while measurable aspects of the interval of the fourth may be clarified in this way, the theory actually attaches to these aspects many other features of musical treatment of the fourth for which the correspondence is only assumed and not proven. Upon closer investigation, it transpires that the assumed correspondence does not hold strictly even in the narrow sense of measurement. "The relationship between degree of consonance and simplicity of ratio in the vibration frequencies is not as direct and simple as this view has maintained, for slightly mistuned consonances remain consonant though their ratios become very complex."[28]

The discrepancies which need to be examined in detail are at this time so apparent as to have led to forthright contradiction of the natural law theory. These failures in interpretation, and not merely a mysterious impatience with the exact sciences, lie behind the approach of musicians who place aesthetic consideration first in the examination of musical structures. "It is true that the element of sound in music is closely associated with the natural laws of acoustics, but these laws in their artistic application have never been rigidly followed, but have been freely modified by the ingenuity and imagination of man. I respectfully but firmly submit that the use of the word 'law' in the sense in which we speak of a 'law of nature,' such, for

[26]Rodolphe Radau, *L'Acoustique* (Paris, 1867), p. 203: "La musique se préoccupe beaucoup moins de la hauteur absolue des notes que de leurs rapports ou *intervalles*. C'est de ces rapports que depend le plaisir que nous cause l'union de certains sons. Quand deux notes sont dans le rapport de deux nombres entiers très simple, elles forment un accord ou une consonnance; les dissonances sont produites par des rapports complexes. C'est dans ce cas qu'on peut dire que la musique est toute dans les nombres."

[27]Ivan Ivanovich Kryzhanovsky, *Biological Bases of the Evolution of Music*, translated by S. W. Pring (London, 1928), pp. 50-51.

[28]Joseph Peterson, "A functional view of consonance," *Psych. Review*, XXXII (1925), p. 17.

instance, as gravitation, is generally, if indeed not always, misapplied. . . . The artistic tendency has been far the stronger in the history of music, in fact, if the laws of acoustics had been literally followed, music, as we know it today, would never have developed at all."[29] "There is no sign of equation between acoustic and aesthetic truth, as some theorists believe. One may be acoustically right and at the same time aesthetically wrong."[30] But it is precisely the juncture of this "acoustic and aesthetic truth," the point at which the declared equation seems to present itself, that constitutes our problem. Seemingly, for good and sufficient if stubborn reasons, the musician hesitates to accept the declared verdict of exact science, and it is perhaps the scientific validity of this verdict that remains in question. "Our perception of tone-relations will not square with the physicist's measurements of vibration."[31]

It is perhaps not correct, therefore, to take as self-evident the interpretation given the connection between acoustical data and consonance response in a musical setting according to the natural law theory. Even were consonance to be defined as pleasantness, a view which few students of the problem would now accept, formulations ascribing consonance in simple fashion to ratios of vibration frequencies may not be as commendably precise as appears on hasty view. They suffer, moreover, from a suspicious and very conspicuous association with the traditional speculations dealing with number-magic and various mystical cosmologies, which suggest the very opposite of the exact sciences. The demonstrable facts of acoustic investigation are not to be dismissed because of this haunting association, but on this account the potentially speculative extensions of meaning of those facts need to be carefully examined so that we can detect at what point in the argument science is left behind. Stumpf has cannily remarked on the need to separate carefully the dicta of science and of astrology, both of which operate with seemingly exact information expressed in similar numerical forms: "Whence stems the generally well-accepted dogma that the satisfaction of tone combination decreases with the consonance gradation of intervals? I would believe that it has theoretical rather than empirical roots; for that even the first time we discover it, namely in *Ptolemy*, there too it stands directly in conjunction with speculative philosophical considerations, which shine forth from it on the old grounds, that the debasement is from the best to the worst."[32]

We may state, then, that the natural law theory, as expressed in terms of the relative frequencies of vibrations in common musical intervals, finds

[29]Walter R. Spalding, "The best balance between radical and conservatve tendencies in the teaching of modern harmony," *Proc. Music Teachers National Assoc.*, V (1910), p. 98.

[30]Joseph Yasser, *A Theory of Evolving Tonality* (New York, 1932), p. 193.

[31]Donald N. Ferguson, "The relation of theory to musicology," *Proc. Music Teachers National Assoc., XXXI* (1936), p. 223.

[32]Carl Stumpf and Max Meyer, "Maassbestimmungen über die Reinheit consonanter Intervalle," *Zeitschrift f. Psychologie u. Physiologie der Sinnes-Organe,* XVIII (1898), pp. 401-402: "Woher stammt das so gut wie allgemein angenommene Dogma, das die Empfindlichkeit für Verstimmungen mit dem Consonanzgrade des Intervalls abnehme? Ich möchte glauben, dass es mehr theoretischen als empirische Wurzeln hat; wie es dann auch sogleich das erste Mal, wo wir es vorfinden, nämlich bei *Ptolemaeus,* mit spekulativ-philosophischen Erwägnungen in Zusammenhang steht, die auf den alten Satz hinauszulaufen scheinen, dass die Verderberniss des Besten am Schlimmsten ist."

concrete support in the physical phenomena of sound: 1. Tones whose frequencies of vibration are in simple ratio constitute intervals which are deemed consonant; 2. Conversely, intervals which are deemed consonant are composed of tones whose frequencies of vibration are in simple ratio; 3. The ratios of vibration frequencies are the reciprocals of the numbers giving the proportional lengths of sounding strings producing the same intervals; 4. It may not automatically follow, however, that consonance in its musical treatment results from these physical relations.

The Harmonic Series

A further incentive to acoustical explanations of musical consonance was provided by the discovery of the harmonic series. Most modern forms of the natural law theory assert a causal connection between the incontrovertible physical facts of this series and the musical phenomenon of consonance.

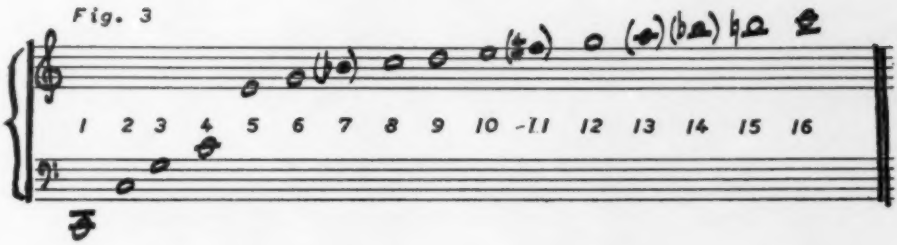
When a sounding body produces a musical tone of definite pitch, the single pitch we hear is known as the *fundamental.* In addition to the fundamental, other tones are usually produced, which are called overtones. Most of these overtones have frequencies that are exact multiples of the frequency of the fundamental tone. They are called harmonic overtones or simply harmonics. We may ignore for our purposes the presence also of inharmonic overtones.

Thus when we hear a tone whose pitch corresponds to a frequency of vibration of 55 cycles per second, there is actually sounding with it a theoretically infinite number of additional tones of the frequencies 110, 165, 220, 275, 330, etc., cycles per second. In practice, these are not perceived as independent tones. In practice, each sounding body produces a characteristic overtone structure peculiar to it, in that certain overtones are amplified, others diminished in intensity, and some are completely absorbed. The differences of overtone structure thereby produce distinctions which we perceive as differences of *timbre* or tone-quality. These real distinctions are quite generally and systematically ignored in discussions of consonance, in spite of the fact that thereby the discussions depart precisely from those real acoustic conditions which purport to provide the scientific foundation for the "law of nature."

Theoretically, therefore, accompanying each musical tone we hear there is an infinite series of harmonic overtones. The mathematical term "harmonic series" indeed originated as a description of this musical phenomenon. Each of these overtones may be shown to have an objective existence, since it may be isolated from the total complex tone by suitable laboratory devices. Normally our attention is directed to the first 16 terms of the series, including the fundamental. Fig. 3 represents these in musical notes, taking the fundamental as C, as it is commonly found in the first few pages of textbooks on musical harmony or on acoustics alike.

To present the harmonic series thus is in part misleading, since its terms appear to be discrete tones whereas they are in fact constituents of a complex. It is to be noted that the series numbers, compared to each other, provide us with ratios of vibration frequencies in a decreasing order of numerical simplicity. The simple

Fig. 3



number ratios deemed efficient in producing the response of consonance, in other words, seem to come to life in the analyzed structure of a single musical tone. If each term in the harmonic series be compared with the term preceding it, we find that the intervals produced by the lowest pairs are those traditionally accepted as musical consonances. If, for the sake of completion, we regard the fundamental itself as a unison or identity, the harmonic series numbers 1 to 6 may be taken to represent the consonant intervals.

Further, if we observe the decreasing order of simplicity of the ratios given by these six numbers, we find within the series also an order of preference among the resulting consonances. We have, in other words, a criterion for deciding which are the best consonances; and in this criterion, once again, the textbooks on musical harmony and on acoustics are in accord.

In Fig. 4 we tabulate in simplified form the relations within the first six terms of the harmonic series. Included in the tabulation are: 1. The order number of the harmonic partials of the tone; 2. The ratio of this number to the preceding one, except in the case of the unison; 3. The musical name for the interval thus represented; 4. The tones comprised in this interval when the fundamental is taken as C; and 5. The usual description of the interval in works on musical harmony.

There are in general acceptance two remaining consonances, the major sixth and the minor sixth. In musical terms, these appear as reciprocals or "inversions" of the minor third and the major third respectively. If we translate the process of inversion into acoustical terms, we find that in one case the upper number of the ratio is halved, and therefore appears an octave lower than originally; and in the other case, the lower number of the ratio is doubled, and therefore appears an octave higher than originally. In both cases, the ratios are reversed; they may be thought of as octave reciprocals.

Fig. 4

Order	*Ratio*	*Interval*	*Tones*	*Description*
1	1 : 1	Unison	C - C	Perfect Consonance
2	2 : 1	Octave	C - c	Perfect Consonance
3	3 : 2	Fifth	c - g	Perfect Consonance
4	4 : 3	Fourth	g - c′	Perfect Consonance
5	5 : 4	Major Third	c′ - e′	Imperfect Consonance
6	6 : 5	Minor Third	e′ - g′	Imperfect Consonance

Specifically, the major sixth, which is but an inversion of the minor third, has the ratio 5:3, as represented by the tones $g - e'$. The minor sixth, which is an inversion of the major third, has the ratio 8:5, as represented by the tones $e' - c''$. Both intervals, like their reciprocals or inversions, are normally classified as imperfect consonances.

What emerges from this description is the fact that for purposes of the study of traditional harmony, octave differences may for the most part be ignored, and any two tones which are one or more octaves apart may be equated to each other. In numerical terms, this means that the terms in an interval ratio, for these purposes, may be divided by 2, or any power of 2, if even division is mathematically possible; and that any term may also be multiplied by 2, or by a power of 2. Octave adjustments, in other words, may be freely employed, since they are held not to change the essential relations among tones.

Due to the potentials of octave reduction, it is unnecessary to add to the list of accepted consonant relations other possible internal relations among the six lowest terms of the harmonic series. The ratio 6:3, as $g - g'$, for example, represents merely an additional octave; and the ratio 3:1, as $C - g$, represents the twelfth, which for most practical purposes is considered equivalent to the fifth.

All the musical consonances, therefore, may be encompassed within the harmonic series numbers 1 to 6. And the lower the terms to which a musical interval may be reduced in this series, the better consonance it is considered to be.

The natural law theory of consonance, however, goes beyond the indications of the facts thus summarized. In effect we are asked, what is the probability that the observed correspondence between the order of terms in the harmonic series and the accepted definitions of consonant intervals is but a coincidence? The probability is clearly negligible: the correspondence cannot be merely coincidental.

Therefore the harmonic series is taken not only to represent musical consonance, but to cause it. The indisputable natural phenomenon of the overtones of a single resounding fundamental is declared to be the natural source for the elementary procedures of the art of music. Such, indeed, is the famous theory of Rameau, who re-states the meaning of abstract simple number ratios as a representation of the "generation" of all musical harmony from the overtones of a single reverberating tone: "The order of the origin and of the perfection of these consonances is found to be determined by that of the numbers; such that the octave between 1 and 2 which is engendered the first is more perfect than the fifth which is found between 2 and 3; below this the fourth which is between 3 and 4; and so on, following always the natural progression of the numbers, and of these admitting only of the sixths as the last."[33]

With the apparently incontrovertible evidence of the harmonic series and its impressive agreement with the accepted musical definitions of con-

[33] Jean-Phillippe Rameau, *Traité de l'Harmonie reduite à ses principes naturelle* (Paris, 1722), p. 5: "L'ordre de l'origine & de la perfection de ces Consonances se trouve déterminé par celuy des nombres; de sorte que l'Octave entre 1. & 2. qui est engendrée la premiere, est plus parfait que la Quinte, que se trouve entre 2. & 3; de-là à la Quarte qui est entre 3. & 4; &c. en suivant toujours la progression naturelle des nombres, & en n'admettant les Sixtes que les dernieres."

sonance, the natural law theory may be said to become scientifically established. Consonance is declared an inherent response to objective physical phenomena. Its perception is to be described accurately in terms of the ratios of small whole numbers. "The data relative to consonance and dissonances are a matter not of aesthetics but of acoustics."[34]

It is not at all surprising that the overwhelming majority of music theorists, whether or not they have themselves investigated all the details of the connection and its implications, when confronted with these facts, have accepted the natural law explanation of consonance as adequate, as scientifically valid.

In terms of the harmonic series, the natural law theory of consonance includes these statements: 1. The harmonic overtones which may be isolated from a single sounding complex tone are produced by vibrations of frequencies which are simple multiples of the frequency of the fundamental tone; 2. The simple number ratios among the first six terms of the harmonic series are responsible for the perception of musical consonance in the corresponding musical intervals; 3. The order in which the overtones appear above the fundamental corresponds to a natural order of preference for musical consonances; 4. The response of consonance is not significantly affected by octave adjustments; 5. Musical harmony is founded on principles emerging from the natural physical properties of sound as discovered in the harmonic series and as represented by the numerical formulation of that series.

[34]Greville Cooke, *Tonality and Expression* (London, 1929), p. 55.

The "Chord of Nature"

If the tones corresponding to the partials 1 to 6 of the harmonic series be sounded together, the resulting chord has been called the *"chord of nature."* The term "chord of nature" refers, then, to an extended major chord whose tones are in the ratios 1:2:3:4:5:6. There are in fact strong indications that this widely accepted analogy is in rigorous scientific analysis wholly mythical.[35] Nevertheless at this point we may go along with the argument.

Since it is possible to ignore any terms in the "chord of nature" which represent merely octave duplications, we may extract from it as a practical resultant the common major triad of ratio 4:5:6. Still taking C as the theoretical fundamental, we discover thus why the C major chord has been eulogized so often as the natural source of all musical harmony, now and forever; for its properties in this light are clearly independent of mere historical exigencies. "The beginning of all music is the simple harmonic series: octave, fifth, fourth, major third, minor third: *C - c - g - c' - e' - g'*. The natural sound of *harmonic consonance* forms the triad *c - e - g*."[36] "Harmony is the science of the chord and of its functions. The chord is an aggregate of three tones, suggested by nature in the phenomenon of resonance."[37] "What

[35]cf. Cazden, op. cit., pp. 782 ff.

[36]A. J. Polak, *Ueber Zeiteinheit in Bezug auf Konsonanz, Harmonie und Tonalität* (Leipzig, 1900), p. 81: "Der Anfang aller Musik ist die einfache harmonische Reihe: Oktave, Quinte, Quarte, grosse Terz, kleine Terz: *C-c-g-c'-e'-g'*. Der Dreiklang *c-e-g* bildet die Naturlaute der *harmonische Konsonanz*."

[37]Maurice Emmanuel, *Histoire de la Langue Musicale* (2 vols., Paris, 1911), vol. 1, p. 22: "L'Harmonie est la science de l'Accord et de ses fonctions. L'Accord est un agrégat de III sons, suggéré par la nature dans le phénomène de la Résonance."

emerges from the chord of nature? The prominent relation between the octave, the perfect fifth, and the major third. Every time a single note is sounded, we hear this combination; and shall continue to hear it until the end of time."[38]

To Rameau, upon whose masterful work most traditional study of harmony has been based to this day, musical consonance, and for that matter all harmonic relations, result from the direct operation of this law of nature. The major chord emerges from a single generating fundamental tone, and its constituent tones may all be discovered in and isolated from that generator. "It is in music that nature seems to assign for us the physical principle of those primary, purely mathematical ideas on which all the sciences rely, I wish to say, the harmonic, arithmetic and geometric proportions, from which follow the progressions of the same type, and which manifest themselves from the first instant that a sounding body resonates, be it in its third and its fifth which resonate with it, and which it makes vibrate in other sounding bodies tuned in unison with this third and with this fifth, be it in its triple and its quintuple, which it equally makes vibrate in other sounding bodies tuned in unison with this triple and this quintuple, without speaking of its octaves, which are nothing but redoublings."[39]

From the properties of a single chord, the explanation is extended to include all the fundamental procedures in traditional musical harmony. "In the fourth, fifth and sixth harmonics of a given generator is to be found the common chord of nature; and the major and minor thirds which compose this chord constitute the basis of all chords. Having obtained one common chord, or triad, as it is also called, two attendant common chords are formed, one of which has for its root the fifth of the given chord, while the other has for its fifth the root of the given chord; in these three chords, known as the primary triads of the key, are to be found the notes of the major diatonic scale."[40]

We may overlook here, for the moment, the implied "proof" of all chords, which presumably would include minor harmonies as well as dissonant ones; the gratuitous addition of two new chords; the assumption, rather than the "natural" proof, of key-relationship; and the reversal of the historical origin of the scale; none of which may be deduced from the stated facts. Our present concern is with the observation that the harmonic series has been used to account for these musical structures, which are thereby also ordained by nature, or so it is generally implied. This author tells us, for example, that "the notes thus obtained from nature are tempered, or tuned, for the purposes of art, in order that all semitones may be

[38]A. Madeley Richardson, *Fundamental Counterpoint* (New York, 1936), p. 12.

[39]Jean-Phillippe Rameau, *Démonstration du Principe de l'Harmonie* (Paris, 1750), pp. vj-vij: "C'est dans la Musique que la nature semble nous assigner le principe Phisique de ces premiers notions purement Mathématiques sur lesquelles roulent toutes les Sciences, je veux dire, les proportions, Harmonique, Arithmétique & Géométrique, d'où suivent les progressions de même genre, & qui se manifestent au premier instant que résonne un corps sonore, soit dans son tiers & son cinquième qui résonnent avec lui, & qu'il fait frémir dans d'autres corps sonores accordés à l'*Unisson* de ce tiers & de ce cinquième, soit dans son triple & son quintuple, qu'il fait également frémir dans d'autres corps sonores accordés à l'*Unisson* de ce triple & ce quintuple, sans parler de ses *Octaves*, qui ne sont que des répliques."

[40]J. Humphrey Anger, *The Modern Enharmonic Scale* (Boston, 1907), p. 31.

exactly equal, so that any note may be taken as a key-note."[41] Yet we have not been given reason for intruding the purposes of art upon nature. It does not follow from the facts of the harmonic series that all semitones should be equal, or that there should be any semitones at all, or that key-notes exist, or that where they exist they be capable of various locations. If we are to estimate correctly the controlling power of acoustical phenomena, we may not arbitrarily introduce these extraneous attributes.

On the other hand, we may properly draw certain necessary conclusions from the natural law theory regarding the history of music and its cultural forms, to wit, that the fundamental basis of music can never change, and that it is the same for all nations of mankind. "The general thing that can be proved by the chord of nature, then, is the major common chord; but this is incontrovertible like the law of gravitation or the multiplication table; and, it may therefore be assumed, will never be permanently discarded."[42]

In this light, it might be instructive to view the attitudes towards the "chord of nature" and its determinative power on the part of those modern composers and theorists who attempt, or are charged with attempting, that very "permanent discard" here declared impossible. "It seems incredible, however, that for a period of five hundred years, we have been ruled arbitrarily by the common chord of C major, unless there be a fundamental principle behind it."[43] Schönberg declares himself unable to state whether the overtone theory be correct or false.[44] On this interesting ground he accedes to the determinative power of the harmonic series as an article of faith: "In the sounding tone and its nearest relative, the union and companionship of tones is constantly demonstrated to our ear, so that we do nothing more than imitate nature when we make use of these relations."[45] Cowell[46] asserts that "the tones of the overtone series, being unconsciously if not consciously heard whenever a single tone is sounded, are a natural criterion." This criterion is accordingly used by Cowell not only to justify tone-clusters, but also for a proposed combination of meters and of tempi in the proportions 4:5:6.

To Hindemith, the extended major triad, "tones 1 - 6 of the overtone series (comprising the octave, fifth, fourth, and major and minor thirds)," represents "one of the most impressive phenomena of nature, simple and elemental as rain, snow and wind. Music, as long as it exists, will always take its departure from the major triad and return to it."[47] Interpreting this abstract departure and return quite literally, Hindemith would have it that an individual composition or movement ought necessarily to begin and end with a major triad, or perhaps an open fifth and octave arrangement; a rule which would automatically exclude Beethoven's 1st Symphony from the repertory of acceptable music. But Hindemith is not dealing with a small matter; for, in his view,

[41]ibid., loc. cit.

[42]Richardson, op. cit., p. 12.

[43]Marion Bauer, "Natural law: its influence on modern music," *Mus. Quar.*, VI (1920), p. 469.

[44]Arnold Schönberg, *Harmonielehre* (Wien, 1922), p. 17.

[45]Arnold Schönberg, "Problems of Harmony," in Merle Armitage (editor), *Schönberg* (New York, 1937), p. 273.

[46]Henry Cowell, *New Musical Resources* (New York, 1931), p. xi.

[47]Hindemith, op. cit., p. 22.

"in the world of tones, the triad corresponds to the force of gravity."[48]

In a recent survey of modern procedures we are informed that "Nature has given us the phenomenon of the harmonic series containing in its first six notes—the most important of the whole series—the major triad. The major triad existed before the first musician was born and it will go on existing after the last musician has left this planet. The classical system is based on the major triad and its closest relative the minor triad. That is why the common triad will always be the clearest symbol of tonality, and that is why the classical system is the most natural and, hence, the most organic of all conceivable tone-systems."[49]

It would appear, then, that composers and theorists of "radical" bent, instead of declaring themselves in opposition to the implied restrictive conditions postulated by the natural law theory, for the most part subscribe to that theory with as much vehemence as do earlier or more conservative theorists. Perhaps we can sense the implication on the part of some contemporary composers of a kind of cynical admission that their music represents a species of sport or aberration, a self-imposed, temporary exile from the normal range of music. Perhaps, though, they have been too easily overawed by the scientific language and terminology in which the issue is inevitably framed. Perhaps some of them have underestimated the fundamental nature of the issue. Perhaps they have been cowed into an uncritical acceptance of a traditional view. Whatever the reason in each instance, the result is uncertainty, an uncertainty especially grievous to those musicians and students for whom the development of contemporary musical composition is of serious moment.

With respect to the "chord of nature," the natural law theory presents the major triad as the epitome of musical consonance provided by the harmonic partial ratios 4:5:6, and therefore as the primary foundation of all musical harmony, ordained by nature. The significant aspects in this regard are: 1. The extended major chord is held to be no more than a realization of the prominent low overtones of the harmonic series; 2. The harmonic series thereby serves as the prototype for the practice of harmony in the art of music; 3. The "chord of nature" has been widely accepted in the traditional theory of harmony as the consonant foundation of music, precisely what the natural law theory requires; 4. It may follow automatically that all other significant structures in musical form may be similarly derived; and 5. Many composers and theorists critical of conventional harmonic practice agree to a special natural status for the "chord of nature."

It should be observed, however, that the natural law theory of consonance, and the interpretation given the physical data and their numerical expressions upon which that theory is founded, have not won unchallenged acceptance either among musicians or among scientists.

Some Criticisms of the "Law of Nature"

Agreement with the conclusions drawn from acoustic investigations relating to the natural origin of mu-

[48]ibid.

[49]Mosco Carner, *A Study of Twentieth Century Harmony* (London, 1944), p. 79.

sical consonance is not unanimous among music theorists or among scientists who have studied the problem. Undoubtedly an important impediment to discussion has been a kind of circular reasoning. That is, musicians have seemed a bit hasty in seizing upon the declared edicts of the physical sciences when these appeared to support their own rules of thumb; they have accordingly not subjected the full meaning of the natural law interpretations to searching analysis. Meanwhile, many physicists and philosophers have been led astray equally by the belief that musicians could not doubt their proofs and that the art of music necessarily reflected the control of natural laws so generally asserted. This circular reasoning, which can so easily lead to a consensus of error, has been called to our attention for some time. Writes Orlandini, "The physicists, not having their auditory organ sufficiently developed to speak of sound, have pronounced peradventure in this regard no light absurdity; which the musicians, because of not having the perseverance to consider well the tales of the physicists, have confirmed, solely through that blind habit which dominates them, and which makes it the easier to consent to the errors, of which they would correct themselves by means of deliberation and reason. And it is thus that the former and the latter pretend that harmony (that is, as much as we understand musically by this word) be in its entirety the work of nature, and that it finds its model of essence whenever a sounding body is struck, and then allowed freely its oscillations."[50]

Ferguson observes that "many attempts were made during the nineteenth century to give to the science of harmony a positive physical foundation by demonstrating that the diatonic scale, from which harmony is developed, is really a 'natural' scale, i.e., that it is a selection of tones from the harmonic series. None of these attempts was successful."[51] Fétis counsels caution with regard to the importance of the harmonic series for musical procedures: "These acoustical facts, badly analyzed, do not have the significance which is lightly accorded them."[52] Admitting the weight of tradition behind the natural law theory, Fétis does not believe that constitutes truth. "From its origin, the idea of the necessity of seeking in an acoustic phenomenon the criterion of the science of harmony had become an article of faith."[53] Hull enters a direct denial of the theory, propounding that "our habit of building-up chords by *thirds* has no scientific basis, and that the coincidence with certain intervals in the natural series of overtones is

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[50]Cesare Orlandini, *Dottrina Musicale* (Bologna, 1845), p. 84: "I fisici, non avendo l'organo uditivo abbastanza sviluppato per parlare del suono, hanno pronunziato per avventura a questo riguardo non lievi assurdità; che i musici, per non avere la costanza di ben ponderare le narrazioni dei fisici, hanno confermate, soltanto per quella cieca abitudine che li domina, e che li fa più facile acconsentire agli errori, di quello che emendarli mediante la ponderazione ed il ragionamento. Ed è percio che gli uni e gli altri, pretendono che l'armonia (cioè quanto noi intendiamo musicalmente con questa parola) sià opera totale della natura, e che si trovi il tipo di essa allorchè un corpo sonoro vien percosso, e lasciata poi libera la sua oscillazione."

[51]Donald N. Ferguson, *A History of Musical Thought* (New York, 1935), p. 475.

[52]Francois Joseph Fétis, *Traité Complet de la Théorie et de la Pratique de l'Harmonie* (Paris, 1849), p. 250: "Ces faits acoustiques, mal analysés, n'ont pas la signification qu'on leur accorde à la légère."

[53]ibid., p. 213: "Dès son origine, l'idée de la nécessité de chercher dans un phénomène acoustique le *criterium* de la science de l'harmonie était devenue un article de foi."

purely accidental."[54] Lenormand, finding the harmonic series of little service for the explanation of early twentieth century harmonic practice, decides that "the harmonic series has been investigated in all possible ways; there have been deduced from it numerous systems more or less ingenious, more or less erroneous."[55] Even Hindemith, after avowing his unbounded faith in the eternal law of the "chord of nature,"[56] complains that "theorists, basing their reasoning on acoustical phenomena, have repeatedly come to conclusions wholly at variance with those of practical musicians."[57]

Frequently, however, we find no more than indecisive equivocation on the question. Thus Capes concedes at one point that "the diatonic scale is not, as some suppose, a mere arbitrary arrangement of tones, but is nothing less than a sequence founded upon the irreversible laws of physical sound."[58] Yet Capes also considers that these laws of sound are not to be identified with the musical function of consonance. He decries attempts "to confuse the greater or lesser degree of perfection in chords *as music*, with their greater or lesser degrees of numerical consonance *as sounds*. "In truth the whole progress of the musical art has depended upon the success with which the great masters have established the close relations of chords and melodies *as music*, in the teeth of the resistance of those who were enslaved to the old superstitions about perfect and imperfect arithmetical combinations."[59] Actual modern harmonic practice, according to Dickinson,[60] "is appreciably removed from the dictates of 'nature,' and the prerogatives of 'art' are asserted. On the other hand, there is no doubt that the combinations of tone which are most readily 'conceivable as entities' are those which have a *prototype* in the chord of nature, and which derive from their indirect confirmation in it a certain fundamental validity and naturalness. Nevertheless, the organism of music is not primarily physical but esthetic, and it is reasonable that combinations of tone from this or any other system, which are not particularly consistent with the chord of nature, may be valid in the free growth of an art of emotional expression." More directly in opposition to the "law of nature" is Ferguson's conclusion: "The musician gloriously defies apparent physical law. Neither his scale nor his system of harmony will exactly square with physical principles."[61]

Yet such assertion of an aesthetic prerogative, however well-founded in musical experience, cannot fail to remain unconvincing in a rigorous examination. The reason is simply that it does not constitute proof, and hence it lends itself to indecisive vacillation and muddling. Musicians, in fact, often seem to fall back on an admission that the natural law theory of conson-

[54]A. Eaglefield Hull, "Scriabin's scientific derivation of harmony versus empirical methods," *Proc. of the Musical Assoc. (London)*, XLIII (1916), p. 19.

[55]René Lenormand, *Étude sur l'Harmonie Moderne* (Paris, 1913), p. 9 fn.; "L'échelle des harmoniques a été interrogée de toutes les façons possibles; on en a déduit de nombreux systèmes plus ou moins ingénieux, plus ou moins erronés."

[56]Hindemith, op. cit., p. 22. Cf. also: Norman Cazden, "Hindemith and Nature," *Music Review*, XV (1954), 288-306.

[57]Hindemith, op. cit., p. 85.

[58]J. M. Capes, *An Essay on the Growth of the Musical Scale and of Modern Harmony* (London, 1877), p. 51.

[59]ibid., pp. 19-20.

[60]George Sherman Dickinson, *The Growth and Use of Harmony* (New York, 1927), p. 11.

[61]Donald N. Ferguson, "The relation of theory to musicology," p. 223.

ance is valid within the limits of the physical sciences, reserving only the right to re-interpret or to deny its specific applications to musical procedures.

To any scientifically-minded person, such denials are no more than tautologies. They are not evidence, unless they be taken as evidence of the weak, terminological level of aesthetic discussion. Láng, for example, puts the issue on this infirm ground: "There is a vast difference between acoustics and the sonorous symbols of the mental process induced by acoustics. The laws of acoustics are different from the laws of the stylistic musical effects and consequences produced by acoustics, it being an aesthetic impossibility for the acoustic values to reach musical values."[62] It cannot suffice, however, that one repeat endlessly, let us say, that blackness is not the same as whiteness, it being impossible for black to be the same color as white. However obvious, the scientist requires rather a detailed description and measurement of the qualities of blackness and of whiteness in fact, in order that the asserted verbal distinction be justified.

It is necessary that the scientist be met on his own ground. If the known connection between musical intervals and simple number ratios be declared irrelevant to aesthetic purposes, despite the indisputable evidence of the proportional lengths of sounding strings, of the ratios of vibration frequencies, and of the harmonic series, then it must be shown by properly scientific investigation wherein the theoretical interpretations of these facts may be in error. The natural law theory of consonance is not to be upset by any number of assertions that in whole or in part it cannot find application to the art of music. The facts and figures for precisely such a demonstration are available, though the ramifications and extent of the task are also more considerable than most musicians or scientists would suspect.

We may remark in this regard that, on occasion, physicists and psychologists have been more critical of the "chord of nature" hypothesis than many musicians are evidently aware. "It has been asserted again and again," writes Mursell,[63] "that the reason why certain intervals are 'consonant' and give the impression of a very close musical relationship is their prominence in . . . the harmonic series. Now we are bound flatly to say that this is a piece of pure mythology, and that musical relationships have nothing to do with the chord of nature."

A plea for a more rigorous examination of relevant terms that have been employed loosely is made by Lloyd.[64] "A phrase that has constantly tripped from the pen of the neo-Pythagoreans was 'the natural phenomenon of the harmonic series.' We may invite the musician to consider its antitheses. 'The natural phenomenon of an *inharmonic* series' is the response of the ear to inharmonic overtones such as those which produce the jangle of a bell. 'An *unnatural* phenomenon of the harmonic series' would be the aural perception of some man whose ears were so different from ours that they would constantly distinguish the different overtones in a musical sound. The response of our ears to vowel sounds is a sufficient

[62]Paul Henry Láng, *Music in Western Civilization* (New York, 1941), p. 546.

[63]James L. Mursell, *The Psychology of Music* (New York, 1937), p. 55.

[64]Llewellyn S. Lloyd, "Musical theory in retrospect," *J. Acoust. Soc. Am.*, XIII (1941), p. 61.

comment...'The natural *phenomenon* of the harmonic series' means that when we listen to a complex vibration built up from a number of pendular vibrations whose periods are in harmonical proportions we hear a musical note. It has no other meaning." As to how closely this last matter is related to a common misunderstanding of the role of timbre in musical perception we shall have to undertake elsewhere. It may be observed that Lloyd makes a leap from the harmonic series as an acoustic phenomenon to the resulting perception of timbre as a psychological phenomenon; a weakness that cannot but be misleading to musicians unprepared for poor formulations from scientists. At any rate, Lloyd concludes from a survey of acoustical investigations that "the chord of nature is, in fact, pure myth, begotten of scientific error by lively imagination."[65]

In sum, we may suggest that criticism of the "law of nature" 1. hinges upon discussion of its difficulties of application to music, on aesthetic grounds; 2. is based on claims of specific discrepancies from observed musical practice, of a nature we have yet to treat; 3. is sometimes lamentably equivocal; 4. cannot be sustained, unless on the ground of adequate scientific evidence; and 5. has appeared in some discussion among scientists.

The acoustic data and their interpretations which we have reviewed show that simple number ratios may be taken as expressions of certain definite physical properties of musical tones and their combinations as intervals or as harmonies. They may or may not serve as a sufficient or even as a proper explanation of musical consonance.

But the connection between musical intervals and simple number ratios has also other dimensions than the physical. Granted that the acoustic phenomena expressible as simple number ratios are objectively real, just how do they affect our hearing and recognition of musical relations, and just how do we become aware of and respond to them on the level required for judgment of musical consonance? The first of these questions pertains to the processes of the sensations of tone, that is, of physiological acoustics. The second deals with the processes of the perception of tone, that is, of psycho-acoustics. The pursuit of these fascinating transmutations of the small integers in these more subjective realms we leave to a further opportunity.

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[65]Llewellyn S. Lloyd, "Modern science and musical theory," *J. Roy. Soc. Arts*, XC (1942), p. 591.

Reviews

EDITED BY THEODORE F. NORMANN

An Introduction to Research in Music. By Allen M. Garrett. Washington: The Catholic University of America, 1958; x, 169 pp.; $3.25.

There has long been urgent need for two good books: one to explain to musicologists the problems, methods of dealing with them, achievements, and objectives of music education in the primary and secondary schools; the other to give to music educators in these schools similar explanation of music education at the graduate level of the university. The interests of the two stages of what is a single process meet at every juncture. They should interlock, but rarely do. The two disciplines involved are poles apart and their adepts, more often than not, at loggerheads. Many a music educator at the graduate level regards the school music educator as a charlatan enslaved by a politically oriented school system and a predacious music industry, while the latter often regards the former as a snob who secludes himself from the realities of American life behind a smoke screen of antiquarianism.

To the observer who attempts to judge the situation objectively, what stands out is the absurdity—even the pathos—of it. Jealous of the sheltered position he has at last gained for his subject and himself in the graduate school, the musicologist who reads these words has probably shuddered at the very thought of his being labeled "music educator." Probably, he prefers to regard himself as a research worker. And that he may be. But he is probably paid to be a teacher. On the other hand, proud of the public trust he holds in the hurly-burly of county, municipal, state, and even national educational, business, social, and political life, the teacher in the lower schools may shudder at the thought that he might be classed as a musicologist. Probably, he would prefer to regard himself as a musician. And that *he* should be. But he is probably paid as much for his talking about music as for his actual making of it. And when we boil down talking about music to its essence, that is exactly what, in a broad sense, musicology is. Music is communication in music; musicology is communication in speech about music. Not any kind of speech; but a disciplined, deliberately methodical kind of speech.

Like everything else, there is good and bad musicology. Much that pretends to be musicology is pretty poor as scholarship, research, literary achievement and even common sense. Much that does not so pretend is scholarly, well-written and sensible. The better formulated the basic assumptions and concepts, the more carefully scrutinized the scientific and critical methods employed, the better should be the rating as musicology, regardless whether the subject be the singing of first-grade children or the palaeography of Byzantine ecphonic accents.

An Introduction to Research in Music does not pretend to fill either of the above-mentioned needs. As stated (p. ix), its object is "to present a survey of the scope and methodology of musicology to the student in his final year of undergraduate study or his first year as a graduate student." Thus, it is designed to enter the music educational process precisely where the clash between conventional music education and conventional musicology is most intense. The first question that comes to mind is whether students as ill-prepared as the author believes his readers will be should be introduced to research at all. A second might be: what teacher, competent to give even an introductory course in musicological research, would use a scrappy, over-simplified primer written in the style of a high school text-book, replete with barbarisms, five of whose twelve chapters deal with matter

appropriate to elementary theory classes? The "methods" of research seem to consist of pigeon-holing data in the manner of a cook-book. The bibliographies are minuscule, not up-to-date, and confined, with a half dozen exceptions, to publications in the English language alone. The critique is dealt with in about four pages under the caption of the "auxiliary science" (!) aesthetics. Popular music is not mentioned; folk music, in one sentence. The effort to give a place to the study of non-European music under the discarded title "comparative" musicology is marred by the obvious ignorance of the author who misses the significance of the reorientation of the study, since World War II, implicit in the new title "ethnomusicology." The conclusion winds up with the fallacious old saw, "Only through a study of the past can we gain an understanding of the present." *Cave!* Understanding of the present can be gained only by study of the present. Study of the past can be done only in terms of the present. Its study can qualify, adorn, deepen our understanding of the present. But if overdone, as it so often is now-a-days, the sure result is *mis*understanding of the present. . . . Which had studied more of the past: Fétis or Beethoven? Certainly, Fétis. Which understood best the present—the musical present —of his day? For my money, Beethoven. Any takers?

CHARLES SEEGER

School Music Administration and Supervision. By Keith D. Snyder. Boston: Allyn and Bacon, Inc., 1959; xiv, 365 pp.; $6.00.

With *School Music Administration and Supervision,* Allyn and Bacon presents the first book in its projected music list, and it looks as though the publisher will have a strong series. The book shows the combined efforts of a competent and experienced author and an imaginative editor. The writing is clear and direct; the format is immediately inviting. Dr. Snyder has denied himself the luxury of spinning out an idea to see how it might sound in various tenses. What he says will be of interest and value to all directly or indirectly concerned with the success of the school music program.

Keith D. Snyder is head of the music department at Los Angeles State College. He has had extensive teaching and administrative experience in the public schools and at the college level. In addition to utilizing his own knowledge and experience, he has secured the advice and help of competent music directors throughout the United States, to whom he gives due recognition.

The author begins by setting up the framework within which a music director works. Here, as throughout the book, neatly-drawn figures make his points graphic. He has not fallen prey to cartoon-type illustrations like those in some recent publications; the reader is presumed to have reasonable intelligence. The chapters cover personal relationships, the curriculum, improving instruction, public relations, scheduling, equipment and materials, budget and finance, space and housing. At the end of each chapter there is a short summary of the content in abstract form.

In the final chapter Dr. Snyder gives rather careful attention to the music director as a part of the school organization and to the purpose of that organization. Some readers may find that the "team theme" is played a little loudly. Further on there is a subhead, "Emerging Trends," which brings to mind a quotation from Lyman Bryson in a recent issue of the *Newsletter* (August 10, 1959) of the Educational Press Association: "Some writers, especially in education, use the word 'trend' with a moral implication, as if what could be discerned as a trend ought immediately to be followed. This is ironically Marxian in flavor. The faithful are supposed to believe that an emerging trend is inevitable and that they ought to hurry it along." It is to be hoped that readers will not feel a moral obligation to hurry along all aspects of the trends noted in the final chapter.

Useful appendices are included, notably Appendix E, which contains sample budgets for both large and small music departments. But its weakness is that no five- or ten-year plans, or budgets that encompass all grades,

one to twelve, are included. Such plans would be of special help to the student of music education. Further, it is not clear in all cases to the student which materials come from what budget items. Appendix E also has a sample request for bids. Appendix F contains excellent drawings and photographs of facilities for housing and storing, and there is a respectable bibliography.

In this new book, music directors who "administer" one-man music departments their first few years in the field will find answers to many vexing problems. Experienced directors, too, will find much practical information. The book has already proved itself as a very useful text in graduate and undergraduate courses in music administration and supervision, and it fills a troublesome gap in available texts for such courses.

BRUCE BRAY

Musikerziehung durch die Schule. Zweite neubearbeitete Auflage. By Rudolf Schoch. Lucerne, Switzerland: Verlag Raeber & Cie., 1958; 295 pp.; no price listed.

Perhaps no other recent publication in Europe dealing with the problems of music education in the public schools is of such significance to music educators on an international basis as is the newly revised edition of Rudolf Schoch's *Musikerziehung durch die Schule,* "Music Education by Means of the School."

The background for this study is the schools of Zurich and particularly the elementary school and classrooms in which Herr Schoch has spent valuable hours in teaching and observing his pupils. These are not the pronouncements of a theorist, though Schoch is that, too, but rather the hard-won results of everyday contact over many years with classroom conditions and the experiences of music-making with children.

Obviously there are many devices and suggestions that cannot apply directly to our American scene, or to any other scene than that of Switzerland. Song lists are only of partial use to us, but the thought expressed in Chapter II, which deals with the new school song books published in Switzerland, is worthy of note. "In all instances care is taken that these songs represent 'music for use' in the best sense of the term, that they employ sensible texts, and that these are from all viewpoints so selected that the youngster who learns them in school will also be inclined to sing them later as an adult. For what the upper elementary grades sing will be most decisive in determining what the people in the future regard as beautiful and worthwhile and retain as a real folk tradition and treasure."

The book is primarily written as a guide or handbook for the elementary classroom teacher, but there is a great deal in it that is usable much beyond the elementary grades. Many passages will remind the American reader that problems with which he has been dealing are not unique with him. Here we have an opportunity to see familiar problems cast in an unfamiliar setting, or unfamiliar problems in a familiar setting. New light is often thrown on topics which for us are regarded as highly controversial by the very reason that little or no controversy exists concerning them in Switzerland. Such is the case with the question of classroom *versus* special music teacher, or "Relative Tonal Conception," the title of Chapter III, which deals primarily with the use of "Sol-Fa" syllables and the use of the handsigns, the latter a widely spread practice among the music teachers in the German-speaking countries of Europe.

It is revealing as well as significant that there are no chapters, not even paragraphs, devoted to such problems as training the select group, preparing of the school musicale, drilling of the marching band, etc. The question of child exploitation for musical entertainment of the public is so completely foreign to the music program of the European public school that not even an oblique reference can be found to it. This does not mean that European schools do not have select groups, or that public performances are never given. These all

exist, but only as a consequence of an overall program which concerns every child's musical education.

The chapters which have the greatest significance for basic music education are those dealing with the child's use of music as a means of self expression and creative activity through manipulation of tonal materials. Chapter VII, "Creative Efforts in Singing and Music Instruction," deals specifically with this central feature in the program of the progressive European music educators of whom Schoch is one of the leading figures. In this creative approach to music teaching lies, perhaps, the solution to the problem of interesting the child in music, or rather, of retaining the child's interest in music, for it is certain that children do not come to their first music lessons with a lack of interest, but rather that they leave them with their real interests dampened if not completely extinguished.

In the closing paragraph of Chapter VII Schoch sums up his philosophy of successful music teaching:

"YOUTH WANTS TO DO THINGS. Youth wants to form life itself; wants to live by its own responsibility. Therefore all those things which appeal to this desire interest youth, such as boys and girls clubs, scouts, airplane flying, sports in general. Something of this searching, introspection, self discovery, 'to get behind the secrets,' is to be found also in a living experience in, and a creative presentation of, music instruction. In this form it will speak more significantly to youth, and particularly to the young boy, than mere drill. It will appeal to the youngster just at THE very time in his development when every attempt to force, to drill, and to recommend is opposed. Creative music instruction will still be able for this same reason to captivate the imagination of youth at the time of puberty and therefore be of greatest educational significance and assistance."

The entire book is filled with useful and stimulating suggestions and information that would repay the reading many times over. Lacking an English translation it can be pointed out that, unlike many German books, the language and style of writing is a model of direct simplicity. Even a modest knowledge of German would suffice for gaining an understanding of Herr Schoch's valuable contribution to music education.

EDMUND A. CYKLER

Guiding Children's Growth Through Music. By L. Eileen McMillan. Boston: Ginn and Company, 1959; vii, 246 pp.; $4.00.

We have long claimed that participation in music helps students to find themselves. From this book, we understand more clearly the powerful needs of the student for self-realization, and the value of music to that end—his need to be accepted, successful, secure in his sense of importance to the teacher and to his classmates, confident in his ability to participate effectively in his own unique ways, and developing self-respect as his understanding and skill in music increase.

"Singing opens the door of music for the young child." The "imitation" stage of learning brings lasting satisfaction through learning to use the full range, quality, and accuracy of his singing voice, in meaningful and musically expressive songs. Through singing he develops greater social effectiveness and use of the rich resources of harmonic expression.

The description of the rhythmic approach to musical experience is especially detailed and practical. We help the child to feel musical rhythm, to express himself creatively, and to expand his understanding and independent use of the structural elements of music. The chapter on *Creativeness* is an illumination of the latent power of the individual and the kind of climate which releases that creative power.

The chapter "Listening Adventures" insists that "always and everywhere music is to be *heard*—in singing, playing instruments, expressive body movement." Many problems of the listening experience are solved, and the various phases of the listening program spelled out—folk music; dress-up folk tunes; descriptive (picture) music; design

(pattern) music; music and the world of nature, of make-believe, of legend; making friends of composers; meeting the instruments of the orchestra; hearing performance, concerts; record collections.

"The Need for Music Symbols" is recognized as the key to full musical growth. The child must find in music symbols the sounds of familiar music experienced, in rhythmic elements, melodic cues (syllables, scale numbers, letter names) and all notation symbols, chosen for study as the child knows, enjoys, and can understand them. As the child asociates sounds with what he sees, he moves from a cooperative use of symbols to independence, depending on the notes rather than the teacher.

Invaluable appendices offer lists of supplementary materials and addresses. There is an eight-page index.

To this reader this is the finest book yet—and it will be hard to beat for helping children through music to become fully developed human beings.

MARION FLAGG

Let's Teach Music in the Elementary School. By Maurine Timmerman. Evanston, Ill.: Summy-Birchard, 1958; vii, 216 pp.; $4.00.

Let's Make Music: Experiences for the Classroom Teacher. By Maurine Timmerman. Evanston, Ill.: Summy-Birchard, 1958; 108 pp.; $2.50.

From *Let's Teach Music* and *Let's Make Music*, any teacher must be convinced that she can teach music. *Let's Teach Music* is a book filled to the brim with the kind of detailed, inspirational help which Miss Timmerman has so long given to the many teachers she has helped to guide. The naturalness of the child-as-music-maker and the naturalness of the musical activities that are spelled out in complete detail will make a natural music teacher, who will be unable to resist the 7 "Let's": Let's See What We Have Done; Let's Respond with Our Bodies; Let's Play Instruments; Let's Sing; Let's Listen; Let's Make Our Own Music; Let's Live with Music. Each of the 7 chapters has questions for class discussion, and a bibliography, as well as descriptions of what to do and how to do it. There are a general bibliography and 9 pages of index.

Let's Make Music is a companion book which contains specific suggestions for giving instruction in singing, playing, and reading the musical score.

MARION FLAGG

The Traditional Tunes of the Child Ballads: With Their Texts, According to the Extant Records of Great Britain and America. By Bertrand Harris Bronson. Princeton, New Jersey: Princeton University Press, 1959; Volume I, Ballads 1-53; 465 pp.; $25.00.

This work initiates a new epoch in the field of folklore. In all the controversies over the relative importance of text and music, musicians never lost sight of the inseparability of both. It was not so with the members of the literary guild who, as the author says, in their disregard of "the continuous interplay of tune and text in the ballads are guilty of a very one-sided approach to their subject." The author's clarion call for a change is clear and emphatic, and for this alone we owe him boundless thanks. Being one of the foremost members of this learned circle himself, it took courage to issue such a challenge.

Studying this first volume, one can only say that the scope of this truly encyclopedic work, comprising as it does an astounding number of versions of the Child ballads, makes this contribution the more valuable as it takes in a considerably larger territory than any of the state-wide collections available. Only on such a basis will a future editor be able to come to sound conclusions concerning what Professor Bronson calls the "habits" of our folk tunes. And while the work necessarily is complementary to that of Child, it is in and by itself a monumental contribution to the field. For any scholar, the two will be inseparable. The enormous work involved in such a critical compilation of all pertinent and available material as given here would alone suffice

to place the author in the front rank among all contributors in the field.

Having said as much, to make a point or two of a slightly critical nature should not be taken amiss. It is quite evident that the author, in his explanations of musical matters, largely addresses himself to scholars who are more or less innocent of any serious acquaintance with music or musical science. To the present writer it remains doubtful whether the musically untrained literary scholar or any other musical layman will take the trouble to go through all the technical explanations and discussions, and the musical scholar should certainly not need them. Furthermore, it is quite doubtful that the fraternity of the latter will to any great extent be willing to accept certain definitions (cf. his use of the term "plagal") which deviate from generally accepted usage. But, in view of the tremendous accomplishment of Professor Bronson in presenting this superb work to the world of musical scholarship, such criticism as this verges on ingratitude. The Princeton University Press also should be congratulated for an outstanding publishing achievement. This volume is a must for any serious scholar, any musician interested in our folk music, and any library.

JAN PHILIP SCHINHAN

Gregorian Chant. By Willi Apel. Bloomington: Indiana University Press, 1958; xiv, 529 pp.; $15.00.

This excellent volume will for decades remain an indispensable *vademecum* for any student and scholar in the field of chant and the history of medieval music. In ten chapters it covers the entire field of Gregorian chant in exemplary clarity, thoroughness, and order. Two further chapters, on Ambrosian chant and Old Roman chant, are written by graduate students whose style and presentation do honor to their teacher. A summary of historical facts in the form of a "Prolegomena to a History of Gregorian Style" concludes the book.

Dr. Apel largely minimizes such tangential problems as the regional varieties of neumes and melodic styles in order to concentrate on his central tasks—the clarification of the development of the chants, of the relationship of this development to that of the liturgy of the Western Church, of the melodic styles of the various chant types, and of their modal and formal aspects. The work of Peter Wagner, the school of Solesmes, and the many other contributors to this field is synthesized and critically clarified at every step while much new research is added to theirs. Whereas other authors assume previous knowledge on the part of the reader, the experienced teacher who wrote this volume does not take anything for granted but, after a few preliminary definitions of terms, presents a clear and complete picture of the liturgy, the sources from which we derive our knowledge of its evolution, the musical and literary sources of the chants, and the development of the Church calendar.

With this as a background the reader readily follows the discussion of the technical chapters on the texts, the notation (including an excellent critique of the Solesmes editions), and the tonal-modal aspects of the chants. The last of these discussions includes illuminating passages on modal ambiguity, transposition, and melodic range in the chants. A chapter on "Methods and Forms of Psalmody" then introduces the "Stylistic Analysis of (1) the Liturgical Recitative and (2) the Free Compositions." These analyses include many new results of original research, such as a clarification of the role of accent in Gregorian chant—textual, melismatic (sustaining), and tonic, and of the cadence and other melodic progressions.

The longest chapter, nearly one third of the entire volume, is devoted to a discussion of the various types of free compositions. Here clear insights are given into such matters as the cento character of tracts and the part cento, part adaptation technique affecting the responsories, the use of migratory standard phrases in graduals, the unusual boldness of melody and clarity of structure in offertories, the various repeat structures of alleluias and the light they throw on the historical development, the evolution of the ordinary of the Mass and

the various structures involved, the types of tropes, etc.

One must, indeed, be grateful for this helpful book in which ideas are put forward with scholarliness, gracious modesty, and good style, buttressed by numerous musical examples, tables, and statistics. The volume is carefully edited and beautifully printed. It contains eight photostatic plates from neumatic codices, a fine index, and a minimum of misprints. The following few inconsistencies are offered merely as an aid to a new edition, not for the purpose of criticizing.

On p. 21 the Canticle of Daniel is said to comprise Daniel 3:56-58 and that of the Three Children Daniel 3:52-57, while,

On p. 29 they appear respectively as 3:57-88 and 3:52-56.

On p. 58f the Rogation Days are listed as added (adopted in Rome) c. 800, though used as early as 470; on the other hand, Trinity Sunday is listed as added 850-950, although it was not adopted until the 12th century according to fn. 6, p. 8.

On p. 97 the distichs have partly wrong scansion signs (long syllables are shown as short).

On p. 113 the *episema* is shown in an example, although it is explained only on p. 115.

On p. 139 the avoidance of the *tritus* (modes 5-6) in alleluias, antiphons, and hymns is discussed, but no conclusion is drawn therefrom.

On p. 146, paragraph 1, a tabulation of the use of modes is made, but the percentage given and the results of the tabulation are incorrect.

On p. 330, fn. 11 ends: "more than twenty tracts with a total of eighty verses"; but the tables on p. 326f show that thirteen of the tracts have a total of eighty-three verses.

On p. 363, line 9, the *ta'amim* are called "possibly synagogal," but the meaning is obviously "originating in the Temple of Jerusalem" or "originating in Biblical times"; the term "synagog" refers to the time after A.D. 70.

HANS TISCHLER

Music in Medieval Britain. By Frank Ll. Harrison. New York: Frederick A. Praeger, 1958; xix, 491 pp.; $10.00.

This masterly volume forms a part of the series, *Studies in the History of Music*, under the general editorship of Oxford's Egon Wellesz. Its author, Frank Ll. Harrison, is Senior Lecturer in Music in the University of Oxford and has spent the year 1958-59 as visiting professor of music at Yale University. The book appears in handsome format, beautifully illustrated with a number of plates reproducing parts of medieval manuscripts, details from cathedral carvings, ecclesiastical statuary, and the like. The musical analyses are copiously illustrated with excerpts from the works under discussion.

In any work dealing with the medieval period, one must, first of all, define the scope of the project; and this Professor Harrison does in his Preface. As to time limits, he says, "The period covered by this book begins with the establishment of Norman constitutions and liturgies following the Conquest and ends with the liturgical and institutional changes brought about at the Reformation;" and he justifies this by pointing out that in the English ecclesiastical arts, musical as well as visual, "medieval styles showed no fundamental change until the new religious ideas became established." As for limitation of content, Professor Harrison makes it clear that his book is to deal with sacred music only; and he justifies this by saying, "In style and function the secular music of the early Tudor courts was the vanguard of the spirit of the Renaissance in England, and so does not come within the scope of this book."

Before taking up the music itself, Professor Harrison gives a detailed background of musical operations and activities in the various ecclesiastical institutions of the Middle Ages ("The Institutions and Their Choirs")—that is, in cathedrals, churches, private chapels, colleges and monasteries. This is followed by an illuminating discussion of all parts of the monodic liturgy for the many different services comprised in Mass and Office ("The Liturgy and Its Plainsong"), together with a section on the

development of polyphonic music within the liturgy ("The Polyphony of the Liturgy from 1100 to 1400").

The rest of the book centers upon liturgical music in use during the period 1400-1550; and the first section here relates this music to the ecclesiastical institutions discussed earlier ("The Institutions and the Cultivation of Polyphony from 1400 to the Reformation"), with copious details from college statutes, royal account books, records of collegiate and parish churches, and chapter acts of the various cathedrals, as well as musical manuscripts. In the discussion of the most important music of the period ("Mass and Motet"), Professor Harrison deals with the work of individual composers. And in the two final sections of the book ("Votive Antiphon and Magnificat" and "Other Ritual Forms; the Carol") he analyses the lesser forms of liturgical polyphonic music while comparing stylistic traits of leading composers—Dunstable, Cornysh, Fairfax, Taverner, and many others.

Although much of the music discussed is available in published form (the Old Hall Manuscript, the various volumes in the Tudor Church Music series), a good deal of Professor Harrison's research is based upon original manuscript sources, still unpublished. One of these he has himself edited and is now seeing through the press—the so-called Eton Choirbook, a large collection of antiphons and Magnificats by leading composers working between 1485 and 1500, discussed here at some length. Professor Harrrison brings new light, too, to the use of the organ in the service and gives some interesting examples of polyphonic pieces in which the organ alternated with the choir. New light is also cast on certain composers—for instance, the "Roy Henry" of the Old Hall Manuscript. Once thought to be Henry VI, Roy Henry is now generally held to be Henry V. Professor Harrison, however, presents what he considers strong arguments for identifying this royal musician as Henry IV.

For those interested in seeing source material upon which the historical part of the book is based, Professor Harrison has provided samples in a series of appendixes—medieval deeds of choral appointments, college inventories with many musical items, and cathedral statutes relating to musical officers and duties. A lengthy bibliography, a register of all the composers, "holders of university degrees in music, masters, informators and organists" of the period, an index of all musical titles found in the text, as well as a general index enhance the usefulness of the book.

In a perusal of these, one notices one or two minor omissions. The composer and theorist John Hothby, for example, nowhere appears, although he was famous enough to be recalled to England, by royal command, from his work abroad (1486). And among several seemingly egregious omissions in the general index is the Old Hall Manuscript, referred to frequently in the text. Several men who were awarded university degrees in music do not appear in Professor Harrison's register of all musicians (because they are omitted in Williams' *Degrees in Music at Oxford and Cambridge*, the source of this listing): a certain Suthey (Sothey), Mus. B. Cambridge, 1489; a certain Wydow, Mus. B. Oxford, incorporated at Cambridge, 1502; Henry Crosse, Mus. B. Cambridge, 1534—and others later in the century. (John Sutton is described here as Mus. B. Cambridge, 1489, with a reference to *Grace Book Delta*. Actually this *Grace Book* begins at the mid-sixteenth century. Several items in *Grace Book Beta* refer to Suthey, 1489.) Nor is there any mention of the organist Thomas Bentlee, alias Deneley, "organplayer" at All Souls in 1458, known to have spent some time in jail on a charge of adultery (see Anstey, *Munimenta academica*, II, 674-75).

Professor Harrison's "Register and Index of Musicians," in fact, seems a bit out of focus altogether. For in it no facts at all are given about the really distinguished musicians of the period: a lone asterisk beside each name indicates that a biographical notice appears in *Grove's Dictionary*. Lesser men, however, are described as composers, organists, choristers, university men, directors, or some combination of

these. Thus, under Benjamin Beryderyke, all that is known of that person appears: Mus. B. Cambridge, 1519. But under Robert Cowper (asterisked), nothing is said of his Cambridge doctorate in music—or of anything else. Thus anyone who wishes to survey briefly the musicians of the period will not obtain a true picture here: he will have to consult *Grove's* for many items.

But these are small matters indeed; and all those who have ever encountered the vagaries of a publishing company and the adamantine stupidity of its editorial assistants will marvel at the completeness, as well as the variety, of these lists.

This book will be indispensable to anyone seriously concerned with medieval music. The student will find it invaluable, for it not only complements and supplements Gustave Reese's two volumes on the Middle Ages and Renaissance but presents for the first time an autochthonous picture of the English musical scene. And the amateur will find in it inspiration for further investigation of music now available only in unpublished sources.

NAN COOKE CARPENTER

Handel's Dramatic Oratorios and Masques. By Winton Dean. London: Oxford University Press, 1959; xii, 694 pp.; $20.20.

More comprehensive than the title indicates, this monumental work of English scholarship covers every aspect of Handel's work and every subsequent interpretation and misinterpetation of its significance. The earlier chapters give a wealth of detail on the background of the oratorios. The material is solidly presented, some of it chiefly valuable to those needing a refresher in the pertinent portions of the history of music, some of it a useful corrective for musical scholars accustomed to making generalities about Lent, the British middle class, and terraced dynamics in the Baroque era. Chapter 4, on Handel's style, sums up judiciously such classical Handelian questions as key associations, musical imagery, and—with much wisdom—the ramifications of Handel's borrowings from himself and others.

The heart of the volume is to be found in Chapters 6 and 7. The first of these, on the oratorios in performance, makes a strong case for staging them like full-blown operas. Two non-Biblical works, *Semele* and *Hercules*, are singled out as "the greatest full-length musical dramas in the English language." Chapter 7, "The Oratorio and English Taste," should be thoroughly digested by anyone who wants to know what happened to English music between the death of John Blow in 1708 and the beginning of our own century. As Dean trenchantly points out, "It would be as futile to blame Handel himself for the consequences of his enthronement as a cultural idol, as to pile the sins that accompanied the worship of the golden calf on that useful animal the cow." And he proceeds with an illuminating account of Jeremy Collier and the revival of Puritanism, the tastes of the new middle class, the Methodists and the Evangelicals, and the view of the Victorians. The author wants to make clear about Handel that "the very last thing he was, at any time in his life, is a moral teacher."

Part II consists of eighteen exhaustive and informative chapters about specific works, interspersed with two "interludes," affording the opportunity for critiques of such non-dramatic works as *Alexander's Feast*, *Israel in Egypt*, and *The Messiah*. The charts in the appendices deal, among other things, with structural analysis, instrumentation, performances during Handel's life, places of performance during Handel's life, borrowings, Handel's oratorio singers, and stage revivals.

The "Index of Handel's Works" actually indexes the comments on his various compositions made in this volume—and remarkably all-embracing they are. The general index also attests its wide and well-proportioned coverage. Proving the rule is the fact that Purcell is cited on forty-two different pages and Blow on only one. Yet as Purcell's teacher, Blow had much to do with the formation of Restoration style, and as Purcell's successor at Westminster Abbey, Blow dominated the musical scene until his death two years before Handel arrived in London. Again and again specific

traits in Handel's music are labeled (here and elsewhere) as Purcellian that with equal justice may be called Blovian.

On the whole Winton Dean has given us one of the most definitive disquisitions to come out of England on any musical subject, stimulating our interest in Handel as a humanist, rather than a moralist, and as the creator of great oratorios, other than *The Messiah*, that we should not only hear —but see.

HENRY LELAND CLARKE

The Sonata in the Baroque Era. By William S. Newman. Chapel Hill: The University of North Carolina Press, 1959; xvi, 447 pp.; $8.00.

"Offered on a silver platter," according to William S. Newman, is the information about violinists and violin music given us by French scholars of the 20th century. "A monumental, thorough, and systematic study," he calls the work of Laurencie in particular. These phrases describe to perfection the book Newman has given us on the sonata in the Baroque era. Over twenty years of research and careful consideration covering every phase of the sonata have produced this first volume of a series that the author still calls the "History of the Sonata Idea." I say "still calls" because he tells us he has moved far from the "evolutionary" approach of his 1939 dissertation.

No doubt it is wise to break away from the rigid concept that all sonatas before the Classic era are to be studied, and indeed judged, by the degree to which they foreshadow the sonatas of Haydn and Mozart. But it would be jumping to the other extreme to adopt an approach so uncompromisingly "semantic" that anything not involving the word "sonata" is dismissed. In practice the author follows no such drastic course. For example, "sinfonias" of Stradella are fully discussed and hailed as "the Baroque sonata suddenly come of age"—"in all but the name."

The first ninety-one pages of this book (Part I) should be required reading for everyone dealing with the sonata—as player, teacher, or even listener. Only this corrective can sufficiently expand our view beyond that of our childhood, when the yardstick for any sonata was a certain 18th-century drawing-room piece with a Koechel number. This first part provides a comprehensive view of the sonata from its beginnings through the 17th century and the first half of the 18th. While recognizing outstanding exceptions, Newman presents the following over-all definition of the sonata: *"a solo or chamber instrumental cycle of aesthetic or diversional purpose, consisting of several contrasting movements that are based on relatively extended designs in 'absolute' music."*

Part II, while continuing to include much information of general interest and many apposite musical examples worthy of individual examination, also tabulates the result of tremendous labors in bringing order out of bibliographical chaos. It is an accurate and exhaustive encyclopedia of Baroque sonatas and their composers, arranged geographically. For many who may not apply themselves to reading or mastering it in detail, it will remain invaluable as a reference work. Especially noteworthy are the many places where an encouraging finger is placed on men and works definitely calling for further research by aspiring musical scholars.

What blemishes there are in the book are chiefly the result of intimate association for many years with the same body of material, namely, a few bits of personal jargon that become second nature to the insider, but seem unnatural to the outsider. For example, the hyphen becomes so definitely the bibliographical link between author and title that the poor ladies whose proper names really do include the hyphen are transmuted into "HARICH/SCHNEIDER" and "WEISS/MANN." Expressions not absolutely self-explanatory like "SS/bass" are used on page 19, but not explained until page 52. Then there are the frequently-used expressions "multivoice" and "polychoir." The current appalling drive toward new noun adjectives is here compounded by polyglot noun adjectives.

And most intriguing to the present re-

viewer is the neologism "melo/bass." The author should be warmly cheered for wanting a term to designate "that general opposition of melody and *b.c.* parts so characteristic of Baroque writing" and for recognizing this as "the one most nearly consistent trait among the widely different styles of over 150 years that we commonly lump under 'Baroque Era'." Certainly "The Missing Term between Polyphony and Homophony" must be found. "Melo/bass" has a sweet sound, but hardly seems to belong to the same family. Is not the fitting term for this "polarity of the outer voices," this "sounding on both edges," "amphony"—with its adjective, "amphonic"?

All in all *The Sonata in the Baroque Era* is a work of assimilation, organization, and communication that might well serve as a model for any aspect of musical research. It is a book worth having, and its sequels are eagerly awaited.

HENRY LELAND CLARKE

Schubert: A Critical Biography. By Maurice J. E. Brown. London: Macmillan & Co., 1958; xi, 414 pp.; $6.75.

"Today, the judgments of the middle and late nineteenth century critics on Schubert are accepted by the majority of music lovers, for, preserved in books and periodicals, these judgments have determined the twentieth century's approach to his music" (p. 195). Probably no major composer has been so romantically distorted by biographers, critics, and teachers as Schubert. In the not-too-distant past, we thought of him as a gloriously inspired, naive musician, who lived a carefree, Bohemian existence and who dissipated nightly in the inns and coffee houses. When the creative urge struck him, he dashed off his great songs on the back of the bill-of-fare. He was supposed to be completely intuitive in his work with no ability for self-criticism or constructive planning. This explained the magnificence of his songs and the tedious, uninspired quality of his long instrumental works, *The Unfinished Symphony* always excepted.

Mr. Brown is not the first writer to attempt to dispel these illusions, although such writers have been far too few. By the end of the nineteenth century, the complete works were published, and by 1914, Otto Erich Deutsch had compiled his German edition of Schubert documents (revised and translated into English in 1947), providing the raw material for accurate studies. Such important recent books as *The Music of Schubert*, edited by Gerald Abraham (N.Y.: Norton, 1947) and Alfred Einstein's *Schubert* (N.Y.: Oxford University Press, 1951) made copious use of these sources. Although Mr. Brown's book does not replace such studies, it is still second to none in importance. It contains the most recent discoveries, the new letters and documents discovered since 1947, and a number of musical fragments and sketches not published elsewhere. He approaches his task with a sense of urgency, with a mission to reveal Schubert in his true stature. The wealth of his information, the keenness of his reasoning, and his thorough understanding of the man and his music is evident throughout. He presents the life without sentimentality, making none of the psychoanalytical revelations so characteristic of many recent biographies; his revelations are those based on exploding the myths and setting the facts straight. In his critique, he reminds the musical world that Schubert's instrumental works are still not fully appreciated, that many great songs are relatively obscure, and that Schubert's full length operas have never been performed.

For those interested in approaching the heart of the study, two chapters are especially recommended: Chapter VI, "The Artist," and Chapter IX, "His Century and Ours." The first is a re-evaluation of Schubert. His education is appraised, his abilities in counterpoint are proved, and his characteristic work method is shown to be a careful process of sketching and revision. Theorists will be particularly interested in his analysis of idiomatic stylistic features. In some respects, Chapter IX is the most remarkable and the most unusual contribution of this book. Mr. Brown does not end his story with the death of Schubert but follows the saga right up to the present. Here one can trace the history of publica-

tion and understand the impossible position of the early biographers and scholars, whose sources were few and inaccurate. The history of performance is presented showing the incredible delay in the programming of great masterpieces. He notes that no accurate evaluation of the operas is yet possible.

Appendices include a listing of the music not found in the collected works and a listing of all the compositions in chronological order. The lack of a formal bibliography is not reprehensible in this case, since the final chapter includes not only the names of important studies but valuable commentary as well. The book is adequately indexed.

Mr. Brown is to be congratulated on a brilliant study which will do much to enhance the position of Schubert among the great immortals.

ROBERT A. WARNER

Experimental Music. By Lejaren A. Hiller Jr. and Leonard M. Isaacson. New York: McGraw-Hill Book Co., 1959; 197 pp.; $6.00.

This work takes the reader step by step through the procedure and mathematics of the use of the calculating machine as it relates to musical composition. This is a recommended book for those whose musical interests lead in these mathematical directions and for all those who really want to keep up-to-date in music theory. For anyone who wants to follow with experiments of his own this will give a working account with complete detail on the calculation and application of the "Monte Carlo" method and the "Information Theory" as these apply to the potential ability of the machine to approximate the action of the mind in dealing with musical construction. At the end there is an actual suite produced by the decisions of the machine. In preceding sections there is a thorough discussion of recent esthetic theory and the theories and methods of the principal innovators of recent fame in the field of mechanical-physical procedures in music; e. g., Stravinsky, Boulez, Stockhausen, Varese, Cage, Ussachevsky, Luening, etc.

The strength of the book is its scholarly thoroughness and its far-reaching speculation into psychological and mathematical foundations of esthetic and musical theory. Its one weakness is that with all its seeming detachment it seems to be wistfully searching theoretical bases and emphases which will "buck up" the romantic hopes of the "Sputnik age" that the machine can contribute significantly to musical art.

There is no doubt that data can be fed into the machine with certain instructions and that a certain phenomenon will result resembling some of the mathematical processes of human thought. But the great potential error here is that there are really no "rules" that in themselves are bases of musical value. Only human feeling coming forth from certain orders of notes can create the miracle of music.

Nevertheless the machine does have its own calm and blank personality and in some limited way belongs to the world of expression; and, of course, this is all very interesting as a speculative realm. This book is definitely worth your time, but be sure to bring your math books, your rose-colored glasses, and maybe a couple of grains of salt.

GEORGE FREDERICK MCKAY

Music Therapy 1957: Seventh Book of Proceedings of the National Association for Music Therapy, Inc. Volume VII. Thayer Gaston, Editor. Lawrence, Kansas: The Allen Press, 1958; xiv, 264 pp.; $5.20.

The National Association for Music Therapy (NAMT) has as its avowed objective "the progressive development of the use of music in medicine through advancement of research, distribution of helpful information, establishment of qualifications and standards of training for therapists, and perfection of technique of music programming which aid medical treatment most effectively." Although music has been recognized since the dawn of history as having therapeutical values, mystical and otherwise, it has been only during the past decade that a systematic effort has been made,

through an organization of music therapists, to counteract many of the loosely conceived and over exaggerated claims for music in the treatment of the mentally and physically ill. NAMT, in common with similar youthful organizations, has had its share of growing pains. It speaks well, however, for the strength of the association that it has prepared annually a book of proceedings which constitutes a record of progress and growth in the uses of music in hospitals and institutions for the mentally ill, of research of concern both to psychiatry and to the psychology of music, and it has done much to systematize professional training and standards for music therapists.

Some comprehension of the scope of this yearbook may be gained from the titles of the various major divisions: Dynamics of Music Therapy, Music Therapy in the Psychiatric Hospital, Music Therapy for Exceptional Children, Music Therapy and Music Education, Dance Therapy, Research in Music Therapy, Question Box Session, and Reports from Regional Chapters. In common with most yearbooks there is some unevenness of quality in the papers presented but certainly among the more substantial one can find abundant food for thought.

Among the highlights of Volume VII is the development of a carefully documented theory by Dr. Thayer Gaston that the highest integrating center is not, in reality, the cortex but lies, perhaps, in a subcortical formation of the reticular system. Dr. Rudolph Dreikers, Professor of Psychiatry at the Chicago Medical School, presents a reasoned approach to some of the major problems which music therapy currently faces. He points out the need for therapists to be more surely grounded in the psychological foundations of therapy and discusses frankly some of the major difficulties present in hospital staff working relationships. In discussing aspects of preventive psychiatry in young people, Dr. Byron L. Casey has some observations to make which apply with equal importance to music education. The sections on music in the psychiatric hospital and music for exceptional children are interestingly written, illustrated with case studies, and, quite aside from their relation to a particular profession, are of real significance in terms of guidance in school music situations. The section on research in music therapy covers seven abstracts of studies relative to various phases of music therapy — geriatrics, background music in group psychotherapy, application of rhythmic stimuli to schizophrenics, resistance of some patients to music therapy, the study of singing in the rehabilitation of Korsakow patients, music therapy in muscular dystrophy, the effect of music on muscle tonus, and a study of potential therapy needs in a federal correctional institution. Most of these are presented in the standard form widely used in medical reports, and, for the most part, are modest segments of a pattern of developing research which in time will fit into a larger framework of practices in music therapy.

One is impressed by several facets of this yearbook. Gone are the loose and exaggerated claims for music therapy which characterized some of the writing in the field in former years. There appears to be a healthy interest and concern with legitimate research, with the accumulation of adequate case studies, and throughout there is a very evident attempt to stress the importance of close consultation with medical personnel. The frequent mention of noteworthy affects of other arts in therapy —dance is already an integral part of the Yearbook—leads one to anticipate a possible expansion of the association to include other arts than music. For those teachers who may be concerned with mental health as an important adjunct of music in the schools these annual reports from NAMT are worthy of careful study. For those who have an interest in the psychology of music the research studies being done in connection with music therapy may well prove to be among the major contributions of the present generation.

THEODORE F. NORMANN

Orchestration: A Practical Handbook. By Joseph Wagner. New York: McGraw-Hill Book Co., 1959; xv, 366 pp.; $6.95.

Mr. Wagner's book has as its point of departure the developing of skill in the transfer of piano keyboard patterns to the orchestral medium. As such, it seems for the most part a book for arrangers since its "novel" feature, the "Reference Chart for Keyboard Idioms and Patterns," occupies nearly half the total number of pages.

The presentation is clear and concise, although in some areas there is the possibility that it may be a bit too concise. Not infrequently the impression is gained that the book is a sort of digest for the harried student whose time for the mastery of orchestration is limited. For instance, the tricky matter of string harmonics and their notation is covered in two pages (one harmonic in the "D" series is omitted); discussion of each wind instrument and its potentialities averages but a single page; chapter fifteen on scoring the woodwinds as an independent section is covered in four pages, with two of these consisting of examples of "America" scored for four, eight, and twelve parts. A similar technique is used with other orchestral groups. When compared with other standard books on orchestration, such as Forsyth and Piston, Mr. Wagner's seems a bit sparse in the basic areas of instrumentation.

There are plentiful examples, handsomely done, although many illustrate the capacities of individual instruments and are shown out of context. The most complete scores are seen in the sections on transcription of keyboard patterns. This feature of the book seems to be its central core. Most composers would prefer to see orchestral techniques grow out of a two-fold development of pure orchestral skill with a creative impetus making orchestration one with the musical idea presented. Mr. Wagner obviously believes the best road to this goal is through learning how to transfer music from one medium to another. A list of available transcriptions is given on page 348 in support of this approach. Among composers who have orchestrated other composer's music, only the names of Ravel (Moussorgsky), Brahms (Haydn), Debussy (Satie), and Berlioz (Weber) stand out. In serious orchestral music, the transcription forms but a small percentage of the entire repertoire.

For the person interested in the transcription approach to orchestration, Mr. Wagner's book should prove useful. In other areas it adds nothing which previous books have not covered in greater detail. It is unique in the comprehensive cataloguing of keyboard idioms, with Mr. Wagner's ideas on proper solutions. A student workbook accompanies the text.

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